

Chapter V. Estimating Occupational Replacement Needs

Information about projected job openings by occupation—openings resulting from employment growth or the need to replace workers who leave an occupation—has many important applications. For example, students and vocational counselors use this kind of information to make career choice decisions, planners of training programs use it to develop education policies, and personnel specialists use it to plan their recruiting efforts. The Bureau of Labor Statistics (BLS) has provided information on employment growth biennially through its occupational outlook program for more than 50 years. In 1992, the Bureau resumed estimating job openings resulting from replacement needs.

After completing a comprehensive research effort, BLS analysts concluded that two definitions and two estimates of separations were needed to provide appropriate information on replacement needs for different users. The first type of estimate, *total separations*, measures all individuals who leave their occupation. The second, *net separations*, measures the net movements of new and experienced workers into and out of occupations. Both measures of separations use data from the Current Population Survey (CPS). After developing historical total and net separation rates, the Bureau calculates projected total and net replacement rates in order to estimate future total and net replacement needs for each occupation in the national employment matrix.

Concepts and definitions

During the past several decades, a variety of concepts has been used to calculate estimates of occupational replacement needs, a component of job openings. These different concepts result in significantly different estimates of separations for the same occupation that often have confused users of the information. This section briefly summarizes the concepts currently used by the Bureau to calculate replacement needs. Figure 1 illustrates the differences between total and net separations. For each age group, the figure shows total and net occupational entrants and separations between February 1999 and February 2000. Younger age groups exhibit an excess of total entrants over total separations as a larger number of young persons begin working in an occupation than leave one. This excess is referred to as *net entrants*. Likewise, the excess of total separations over total entrants in older age groups is referred to as *net separations*.

Total separations. Total separations identify the flow of individuals leaving an occupation, for any reason whatsoever, without regard to persons entering the occupation. Total separations are the larger measure of separations. During a given period, individuals may leave an occupation

for a variety of reasons. Some become employed in a different occupation as a result of a promotion; a desire to change careers; the loss of an existing job; the need for a different job while attending school, while training, or while caring for one's family; or some other reason. Others who leave an occupation stop working altogether because they retire, desire more time for leisure or for an extended vacation, assume family responsibilities, return to school, move out of a particular geographic area, become ill, or have some other reason for leaving. If employment in an occupation is to increase or remain the same, those individuals who left the occupation must be replaced. In this case, total occupational separations are the replacement needs. If employment is declining, however, occupational separations exceed replacement needs by the amount of decline in employment, because some persons who leave the occupation are not replaced. (Individuals who change employers, but remain employed in the same occupation—the sum of which events often are referred to as “turn-over”—are not included in counts of replacement needs, because job changes by these individuals have no impact on the number of openings for persons wishing to enter an occupation.)

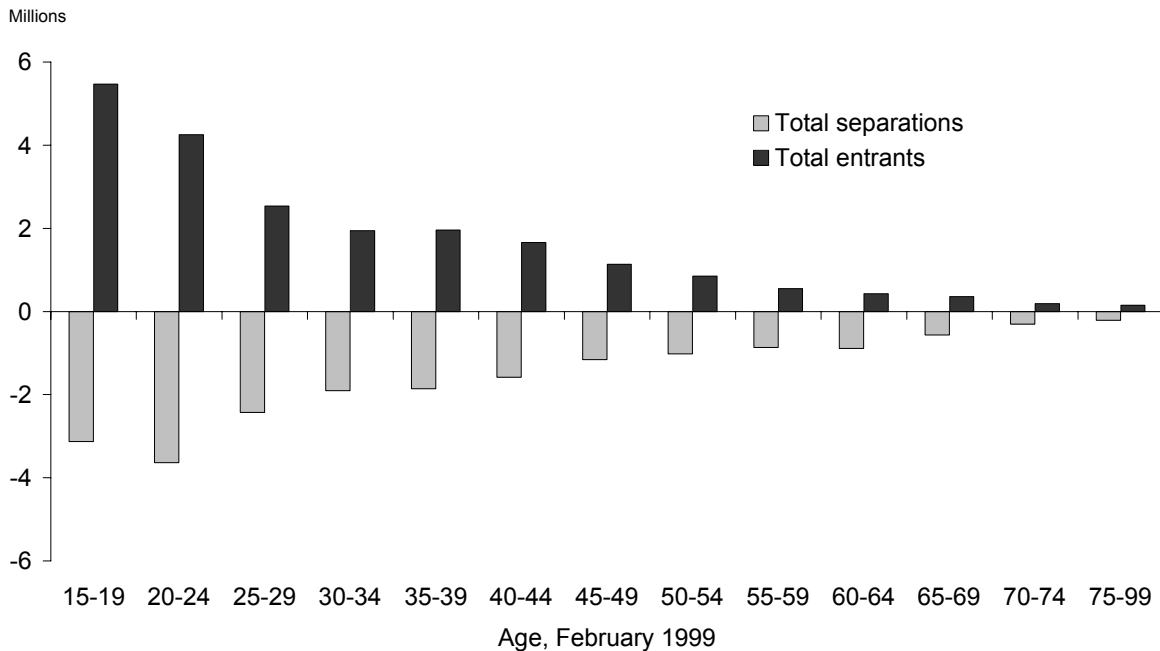
Net separations. Net separations summarize movements of workers into and out of an occupation over a specific period. If employment is not declining, net separations approximate the number of persons who permanently leave an occupation: net separations quantify the need for new entrants and, if training is required, identify minimum training requirements.

Employment data, by age, at two points in time are used to estimate net separations. For example, occupational employment, by age, is prepared for a base year and for 5 years later. Employment figures for each age group in the base year are then compared with employment figures for the group that is 5 years older. For instance, in a given occupation, employment in the base year for the 55- to 59-year-old group is compared with employment 5 years later for the 60- to 64-year-old group. If employment has increased from the base-year age group to the 5-year-older age group, then the increase measures net entrants into the occupation for the latter group, and net separations from the occupation for that age group are zero. If, instead, employment has declined from the base-year age group to the 5-year-older age group, the decline is recorded as net separations from that occupation for the latter group. The total net separations from the occupation in question are then the sum of the net separations from that occupation for all age groups.

Figure 1. Total and net occupational entrants and separations, February 1999 to February 2000

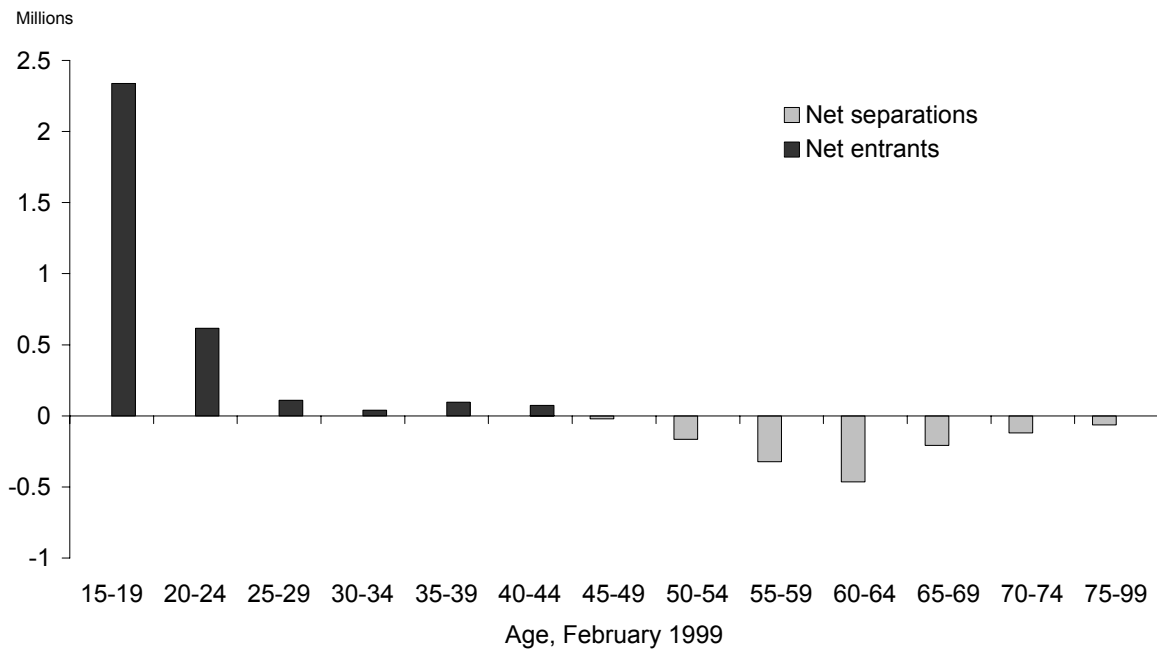
Total separations:

- Occur in all age groups
- Are independent of the total number of entrants
- Identify all of the normal movements out of occupations



Net separations;

- Occur only when total separations exceed total entrants within an age group
- For an occupation, are the sum of separations for each age group
- Exclude information about net entrants



It is important to note that, within any age group, individuals may have done any of the following to stop being included in employment data for a particular geographic area: Left the occupation in question and started working in another occupation, stopped working altogether, or left the area. Similarly, individuals entering an occupation in a geographic area may have been working in another occupation, may not have been working at all, or may have come from another area. The change, measured over the period in question, thus reveals only whether there were more or fewer entrants than separations and tells nothing about the numbers of total entrants, total separations, or any of their components. That is, the change indicates whether the size of the original age group increased or decreased, but it indicates nothing about the specific actions of individuals making up the group.

Replacement needs. In developing estimates of replacement needs, the distinction between separations and replacement needs must not be overlooked. When employment in an occupation remains the same or increases over a given period, replacement needs equal separations. When employment declines, replacement needs are less than separations because some individuals leaving an occupation are not replaced.

During a period when employment in an occupation declines, total separations will be greater than they would be if employment were increasing, because more individuals lose their jobs. Net separations would be greater not only because more individuals leave, but also because fewer enter, the occupation. A decline in employment represents individuals who left an occupation and were not replaced; therefore, replacement needs during a time of declining employment are determined by reducing observed separations by the decline in employment.

Although it is conceivable that employment could decline to zero, the possibility is remote, especially with national data. In such an unlikely scenario, separations would equal the previous number of employees, because all lost their jobs, and replacement needs would be zero (replacement needs = separations – employment decline = 0). During periods of employment decline, displaced workers are available to reenter the occupation later and thus may reduce the need to train additional workers.

Developing measures of total separations

All individuals who leave an occupation—those who transfer to another occupation or who stop working for any reason—must be included in a measure of total separations. Producing such a measure requires longitudinal data that include information about individuals at two points in time. During the late 1970s, BLS researchers developed a procedure for using CPS data to estimate the number of job openings arising from workers who leave their occupation between two points in time that are 1 year apart. Annual data are preferable to data with other periodicities because most data on the completion of training programs are compiled

on an annual basis. Annual total separation data thus facilitate analyses of occupational supply and demand.

The method of measuring total separations entailed using computer records to track the same individuals in the CPS over a 1-year period. Monthly data from August 2000 to July 2002 were assembled, and data for each of the first 12 months were matched to data for the same month 1 year later. For example, monthly data for August 2000 were matched with monthly data for the same individual in August 2001. The use of data from the matched sample permitted changes in an individual's employment status and occupation to be tabulated.

Over time, individuals may respond differently to the same CPS question about their occupation, responses may be recorded differently by interviewers collecting the data, or recorded information may be interpreted and coded differently by persons preparing files for computer processing. All these actions result in a different occupation being recorded in the second year when, in fact, no change of occupation occurred. Data on January 2001–02 occupational transfers from the January 2002 CPS supplement were used to rectify this overestimation of occupational transfers in matched CPS data.

Combining 2001–02 matched CPS data and occupational transfer data from the January 2002 CPS supplement yields *merged data* that provide a composite description of movements into, out of, and between occupations over two points that are 1 year apart. The resulting merged data identify the numbers and types of separations and the characteristics of workers who change occupations, become unemployed, or leave the labor force.

Data on total separations for occupations with fewer than 50,000 employees were judged unreliable because of the limited number of observations in the sample. Data for the remaining occupations were examined individually, and if data identifying specific reasons for leaving the occupation appeared suspect, another detailed occupational group was selected to serve as a proxy and provide substitute data.

The CPS is conducted primarily to obtain current data on the labor force status of individuals, rather than data that measure changes over time. As a result, there are significant limitations to the data that describe change. The CPS is a household survey that collects data from persons living at specific addresses. One limitation to the matched sample is that information can be developed only from the responses of individuals who do not change their residence. Movers tend to change their labor force status more than do non-movers; hence, the separation rates are biased downward because movers are not included. Separation rates also are biased downward because the CPS excludes individuals who die between surveys.

By contrast, response and coding errors bias the separation rates upward. For example, if employed persons were incorrectly classified as not being in the labor force during the second survey, the matched data would indicate movement where none occurred. Although the net effect of

the various biases on the movements is not known, their impacts appear to be offsetting and are not concentrated by occupation.

It must be emphasized that total separation rates developed from merged CPS data are not measured rates based on longitudinal data about individuals, but rather are a composite estimate of movements from occupations based on CPS data from two distinct sources. However, the rates are occupation specific and are extremely valuable for describing the labor market.

Developing measures of net separations

Changes in age groups over a 5-year period provide a comprehensive measure of occupation-specific net separations. When the size of a group increases, a measure of net entrants is recorded; when the group's size declines, net separations are identified. Net changes in an age group capture the net effect of transfers into and out of occupations, immigration, and emigration, as well as labor force entries and separations, including deaths. A 5-year period was chosen to reduce the impact of cyclical variations that might affect comparisons made over a shorter period. Estimates for other periods can be developed, however. Estimates also can be developed for industry, educational level, sex, and a variety of other demographic variables. This new "cohort" technique thus becomes a powerful tool for analyzing labor market changes.

Employment estimates for appropriate age groups, by occupation, were developed for 1993–98, 1994–99, 1995–2000, 1996–2001, and 1997–2002. Initially, several hundred thousand records containing information on occupation, age, and many other characteristics for all employed persons in 1993 were combined, and occupational employment by age group was tabulated. The process was repeated to obtain estimates for desired age groups in 1998. To increase the sample size and reduce cyclical fluctuations, estimates for the age groups for which 1993 employment was tabulated also were developed for 1994, 1995, 1996, and 1997, and estimates for the age groups used in

Table V–1. Net separations for registered nurses and for waiters and waitresses, by age group, 1997–2002

(Numbers in thousands)

(Numbers in thousands)

1997 employment ¹		2002 employment ²		Net change, 1997–2002	Net separations, 1997–2002	Separation rate, 1997–2002 (percent)
Age	Number	Age	Number			
Registered nurses						
16–99.....	1,971	—	2,145	174	151	7.7
		16–20	1	1		
16–19.....	1	21–24	57	56	0	0
20–24.....	67	25–29	204	137	0	0
25–29.....	202	30–34	257	55	0	0
30–34.....	286	35–39	324	38	0	0
35–39.....	368	40–44	406	38	0	0
40–44.....	385	45–49	371	–14	14	3.7
45–49.....	277	50–54	254	–23	23	8.3
50–54.....	182	55–59	150	–31	31	17.2
55–59.....	115	60–64	82	–33	33	28.7
60–64.....	61	65–69	25	–36	36	59.6
65–69.....	19	70–74	9	–10	10	52.1
70–74.....	6	75–79	3	–3	3	52.4
75–99.....	2	80–99	1	–1	1	33.1
Waiters and waitresses						
16–99.....	1,410	—	1,408	–2	452	32.0
		16–20	377	377		
16–19.....	263	21–24	311	48	0	0
20–24.....	402	25–29	191	–211	211	52.7
25–29.....	212	30–34	121	–91	91	42.8
30–34.....	172	35–39	120	–52	52	30.0
35–39.....	133	40–44	96	–37	37	27.8
40–44.....	79	45–49	62	–17	17	21.0
45–49.....	52	50–54	43	–9	9	16.8
50–54.....	39	55–59	26	–14	14	34.8
55–59.....	25	60–64	20	–5	5	20.1
60–64.....	22	65–69	10	–12	12	56.5
65–69.....	8	70–74	6	–2	2	22.6
70–74.....	3	75–79	1	–1	1	49.6
75–99.....	2	80–99	1	–1	1	69.1

¹ 1997 data are averages of 1993, 1994, 1995, 1996, and 1997.

² 2002 data are averages of 1998, 1999, 2000, 2001, and 2002.

1998 were developed for 1999, 2000, 2001, and 2002. Data on employment by occupation, by age group, were then averaged and used to prepare the estimates presented in this chapter. To simplify the presentation, all references to 1997 data represent averages for 1993, 1994, 1995, 1996, and 1997, and references to 2002 data represent averages for 1998, 1999, 2000, 2001, and 2002.

In most occupations, net leavers occur only in the older age groups, usually above age 45. This pattern typically describes individuals leaving in large numbers to retire. A different pattern displayed in some occupations is the vast majority of all net separations taking place in the youngest age groups. In this case, large numbers of workers probably obtained employment in the occupation when they first entered the workforce. Then, when they were ready to begin full-time jobs, or when they qualified for higher paying jobs, they transferred to another occupation. In both patterns, the net separations quantify the number of persons who permanently left the occupation. Table V–1 shows

Table V–2. Net separations in selected teaching occupations, by age group, 1997–2002

(Numbers in thousands)

Current Population Survey occupation	Number employed, 1997 ¹	Age group													
		16 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to 99	
Teachers, except college and university.....	4,556	0	0	0	0	0	0	13	100	101	64	23	7	7	
Teachers, prekindergarten and kindergarten..	526	0	0	0	0	0	2	0	2	4	6	2	1	2	
Teachers, elementary school.....	1,750	0	0	0	0	0	0	13	47	42	28	7	1	2	
Teachers, secondary school.....	1,214	0	0	0	0	0	0	18	51	42	18	6	1	1	
Teachers, special education.....	326	0	0	2	2	0	0	3	8	8	4	1	0	0	
Teachers, n.e.c. ²	740	0	0	0	0	0	0	0	0	5	8	7	4	3	

¹ 1997 data are averages of 1993, 1994, 1995, 1996, and 1997.² n.e.c. = not elsewhere classified.

these different patterns and illustrates how net separations for registered nurses and for waiters and waitresses were calculated.

In table V–1, employment data by age group for registered nurses and for waiters and waitresses in 1997 are compared with corresponding data for a 5-year-older group in 2002. For example, the number of registered nurses aged 20 to 24 in 1997 is compared with the number of registered nurses aged 25 to 29 in 2002, and the difference is calculated. If the difference is positive, more individuals aged 20 to 24 in 1997 entered than left the occupation. Nothing is known about the numbers of persons transferring into the occupation, entering the labor force, immigrating from another country, transferring out of the occupation, leaving the labor force, or leaving the United States. The difference between the two groups simply identifies the amount by which total entrants exceed total leavers. If, by contrast, the difference is negative, more individuals left than entered the occupation. Only a negative difference results in a measure of net separations; positive differences are recorded as zero net separations for the age group. The separation rate for an age group is calculated by dividing net separations by 1997 employment in the age group. Net separations for all age groups were totaled and divided by total employment in 1997 to obtain the 5-year net separation rate for the occupation.

Table V–1 also presents information on the percentage of leavers in each age group for registered nurses and for waiters and waitresses. This measure is calculated by dividing net leavers in the age group by 1997 employment for that age group. Information about the percentage of leavers in each age group is valuable because it permits estimates of net leavers in the future, a topic that will be discussed later.

Because registered nurses and waiters and waitresses are large occupations, the CPS sample provides quite reliable employment data for each age group within them. However, for small occupations, such as actuaries, the sample is too sparse and the net separation data are unreliable. For example, actuaries have an irregular distribution of net separations among the age groups, and the net separation rate of about 19 percent is inconsistent with rates for other professional and related occupations.

To obtain a separation rate for each detailed CPS occu-

pation, one of two procedures was used when data for an occupation were judged unreliable. When a larger detailed occupation had characteristics similar to those of the occupation in question, the larger occupation was chosen as a proxy, and the separation and employment data for the proxy occupation were substituted for the unreliable data and were used to calculate separation rates. When there was no larger detailed occupation with characteristics similar to those of the occupation in question, separation and employment data for a summary occupation group were substituted for the unreliable data.

The procedure for determining separation rates for summary occupations, however, was not as straightforward as that for detailed occupations. Note that, in table V–2, no net separations are measured for the summary occupation group teachers, except college and university, until age 45. Yet, two of the detailed occupations that make up the group—prekindergarten and kindergarten teachers and special-education teachers—exhibit net separations prior to that age. The summary occupation group does not register those separations because total net entrants in the other detailed occupations constituting the summary occupation group exceeded the total of net separations among prekindergarten and kindergarten teachers or special-education teachers in the relevant age group. To exclude the measure of net separations from the summary occupation group, however, would result in an understatement of separations from detailed occupations. To overcome this limitation, net separations in each age group for summary occupations were calculated by totaling the net separations for each detailed occupation in that age group. Thus, in table V–3, the net separation data for each age group in the summary occupation group teachers, except college and university, is the sum of the data measured for prekindergarten and kindergarten teachers, elementary school teachers, secondary school teachers, special-education teachers, and teachers not elsewhere classified. (The totals shown may not be the sum of the data for detailed occupations due to rounding.)

Projected replacement rates

Thus far, all information presented about separations has been descriptive and retrospective; that is, it has described what occurred in the past. The BLS employment projections program, however, focuses on future opportunities, a pur-

Table V-3. Net separations in selected teaching occupations, adjusted summary occupation, by age group, 1997–2002
(Numbers in thousands)

Current Population Survey Occupation	Number employed, 1997 ¹	Age group												
		16 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to 99
Teachers, except college and university.....	4,556	0	0	2	2	0	2	35	108	101	64	22	7	8
Teachers, prekindergarten and kindergarten..	526	0	0	0	0	0	2	0	2	4	6	2	1	2
Teachers, elementary school.....	1,750	0	0	0	0	0	0	13	47	42	28	7	1	2
Teachers, secondary school.....	1,214	0	0	0	0	0	0	18	51	42	18	6	1	1
Teachers, special education.....	326	0	0	2	2	0	0	3	8	8	4	1	0	0
Teachers, n.e.c. ²	740	0	0	0	0	0	0	0	0	5	8	7	4	3

¹ 1997 data are averages of 1993, 1994, 1995, 1996, and 1997.

² n.e.c. = not elsewhere classified.

pose that requires projections of employment change and, in addition, projections of replacement needs due to total and net separations.

Total replacement rates. Total separation rates for all detailed occupations were developed from merged CPS data for the period 2001–02. As described earlier, total separation rates from proxy occupations were substituted for small occupations when data for the latter appeared unreliable. If employment in the occupation in question remained the same or increased from 2001 to 2002, the 2001–02 total separation rate also was the replacement rate and should be used to estimate replacement needs during a projection period. However, if employment in the occupation declined, the replacement rate was calculated by subtracting the employment decline from the separations. Total replacement rates were used without adjustment for the 2002–12 projection period. Employment for 2007, the midpoint of the period, was multiplied by the annual average replacement rates for the 2001–02 period to project annual average replacement needs over the 2002–12 period. Although labor market conditions affect the replacement rates, attempts to adjust the rates would be fraught with difficulties because not enough is known about how cyclical factors and other labor market conditions affect the rates.

Net replacement rates. To develop a net separation rate for an occupation, employment figures for that occupation in a given age group in 1997 were compared with employment in the occupation in 2002 for a group that was 5 years older. (As noted earlier, data for 1997 actually consist of the average of data for 1993, 1994, 1995, 1996, and 1997, and data for 2002 consist of the average for 1998, 1999, 2000, 2001, and 2002.) If employment for the group increased, no net separations occurred, and separations were recorded as zero. If employment declined, the number was recorded as net separations for that age group. The 5-year net separation rate for the age group was calculated by dividing the number of net separations by employment in 1997. (See table V-1.) The 5-year net separation rates for 1997–2002 for each age group could then be applied to employment in future years to obtain a projection of net separations. Excluded from these projections are the replacement needs attributable to those entering the occupa-

tion within the projection period.

Between 1997 and 2002, employment in most occupations increased or remained the same. For these occupations, the 1997–2002 net separation rates, by age, were used without adjustment to estimate net replacement needs during the projection period. If employment declined, however, one of several adjustments to the age-specific separation rates was used to obtain a net replacement rate that reduced the occupational separation rate by the rate of decline in employment. When the employment decline was less than the number of net separations among persons aged 16 to 49 in 1997, the number of net separations for that age group was reduced by the decline, which was distributed in proportion to the number of net separations in each age subgroup of the group aged 16 to 49. This technique, which confines the adjustments to the ages most affected by adverse economic conditions, was the one most frequently used. Older workers are more likely to remain employed until they retire. In most of the remaining cases, the net separations were reduced in a like fashion for persons aged 16 to 54 or persons aged 16 to 64, depending on the distribution of net separations in the occupation and the amount by which employment declined. Then, the adjusted age-specific rates were used to calculate future net replacement needs for persons employed in 2002.

Using data for persons employed as registered nurses in 2002, table V-4 illustrates the method for calculating net leavers over the period 2002–12. First, net leavers were calculated for 2002–07 by multiplying 2002 employment obtained from the CPS for each age group by the replacement rate for the same age group in 1997–2002. Before net leavers in 2007–12 were calculated, 2007 employment for each age group was estimated by identifying employment in 2002 for a 5-year-younger age group and subtracting any projected net leavers for the period 2002–07. For example, table V-4 shows the 2007 employment figure for registered nurses aged 55 to 59 to be 210,000. This estimate was arrived at by identifying the 2002 employment figure for nurses aged 50 to 54 (254,000) and subtracting the 44,000 net leavers in 2002–07 from that age group. (Any discrepancies are due to rounding.) Then, net leavers for 2007–12 were calculated by multiplying employment for 2007 for each age group by the replacement rate for that age group. Summing the number of net leavers for each of the 5-year

periods 2002–07 and 2007–12 provided an estimate of net leavers over the 10-year projection period 2002–12. The 2002–12 net replacement rates were calculated by dividing net leavers for 2002–12 by 2002 employment. Dividing the net leavers for 2002–12 by 10 yielded annual average net replacement needs.

New entrants—individuals who were younger than age 16 in 2002, but who could be expected to join the group of employed persons after 2002—were not included in the estimate of replacements for 2002–12. If they would have been included, estimates of replacements for occupations with net transfers in the younger age groups—such as those for waiters and waitresses—would be larger.

Replacement rates based on the Occupational Employment Statistics survey

The preceding sections described procedures for estimating replacement rates by using detailed occupational data from the CPS survey. However, the employment matrices used by the BLS projections program to estimate current and projected occupational employment are based primarily on data from the Occupational Employment Statistics (OES) survey, which uses occupational definitions consistent with the 2000 Standard Occupational Classification system. BLS then uses current and projected occupational employment estimates from these employment matrices to calculate the employment-growth component of projected job openings. Combining the replacement-needs component of projected job openings with the growth component of projected openings requires developing occupational replacement rates that are consistent with the OES survey. These rates were developed by (1) identifying the

Table V–4. Net replacement data for registered nurses, by age group, 2002–12

(Numbers in thousands)

Age	2002 employment ¹		Net leavers, 2002–07	2007 employment	Net leavers, 2007–12
	Number	Net replacement rate, 1997–2002 (percent)		Number	
16–99.....	2,145	7.7	200	—	253
16–19....	1	0	0	0	0
20–24....	57	0	0	1	0
25–29....	204	0	0	57	0
30–34....	257	0	0	204	0
35–39....	324	0	0	257	0
40–44....	406	3.7	15	324	12
45–49....	371	8.3	31	391	32
50–54....	254	17.2	44	340	59
55–59....	150	28.7	43	210	60
60–64....	82	59.6	49	107	64
65–69....	25	52.1	13	33	17
70–74....	9	52.4	5	12	6
75–99....	4	33.1	1	7	2

¹ 2002 data are averages of 1998, 1999, 2000, 2001, and 2002.

CPS occupation or occupations that are equivalent to the detailed OES survey-based occupation and (2) either using the CPS rate directly or calculating a weighted rate, with OES or CPS employment figures as weights, if the occupation consists of more than one OES or CPS occupation. Table V–5 presents 2001–02 total and 2002–12 net replacement rates for OES-based matrix occupations and shows 2002–12 annual average total and net replacement needs. Information identifying OES occupations for which CPS equivalent occupational data were replaced with that of a proxy CPS occupation is available from the Chief, Division of Occupational Outlook at (202) 691–5703.

Frequently asked questions about replacement needs

Q. Why does BLS compute estimates of both total and net replacement needs?

A. A single estimate is not appropriate for all purposes. Vocational guidance counseling, for example, requires information about growth and replacement needs that quantifies all opportunities in the labor market. By contrast, information about opportunities for new entrants is more useful for planning appropriate training programs. Thus, two different estimates are provided.

*Q. Why are the estimates of growth and net replacement needs described as providing a **minimum** measure of training needs?*

A. Training needs are underestimated by this measure because for many occupations, not all persons who complete training enter the occupation for which they qualify. As a result, more workers may be trained to ensure that an adequate number is available to fill expected job openings.

Q. Do the 2002–12 projected net replacement rates assume that future labor market behavior will not change from past patterns?

A. Yes, 1997–2002 occupation- and age-specific rates are used in calculating the projected rates. The 1997–2002 rates are applied to projected occupational age-distribution data. The result is an occupation-specific replacement rate that captures the impact of demographic, but not behavioral, changes.

Q. Are total and net separation rates the same as total and net replacement rates?

A. In most occupations, yes. If employment declines during the period being examined, however, separations will exceed replacement needs by the decline in employment. The reason is that, when employment is declining, not all persons who separate from an occupation are replaced.

Q. Should a projected decline in employment be subtracted from replacement needs to estimate job opportunities?

A. No! If employment declines, the number of opportunities resulting from growth is zero, and replacement needs constitute the only source of opportunities. When employment declines, separations increase both because individuals are losing their jobs and, in the case of net separations, because fewer are entering the occupation. Replacement needs—calculated by reducing separations by any decline in employment—should not be further reduced by projected employment declines.

Q. If employment is declining rapidly, is it possible for replacement needs to be zero?

A. In the extreme case, yes. For example, assume that, in a limited geographic area, a single firm is the sole employer of tool and die makers. If the firm ceases operations, all tool and die makers in the area will leave the occupation; separations will equal the decline in employment, and there will be no replacement needs. An analogous situation, though possible, is unlikely to occur at the national level because not all areas of the country share the same market conditions.

Q. Are there any data on replacement needs by industry?

A. No, estimates of replacement needs are created only for occupations. The Bureau of Labor Statistics has a survey that collects data on current job openings and labor turnover by industry. There is no equivalent survey of job openings or labor turnover by occupation. For more information, see the Job Openings and Labor Turnover Survey program Web site: <http://www.bls.gov/jlt/home.htm>.

Table V–5. Total and net replacement rates and annual average replacement needs, 2002–12

(Numbers in thousands)

2002 national employment matrix occupation		Total employment, 2002	Replacement rate (Percent)		Annual average replacement needs, 2002–12	
			Total, 2001–02	Net, 2002–12	Total	Net
00-0000	Total, all occupations	144,014	15.9	23.5	24,571	3,389
11-1300	Management, business, and financial occupations	15,501	11.0	17.4	1,833	270
11-0000	Management occupations	10,056	10.7	17.2	1,142	173
11-1000	Top executives	2,669	10.5	18.7	305	50
11-1011	Chief executives	553	9.7	18.9	58	10
11-1021	General and operations managers	2,049	10.9	18.9	243	39
11-1031	Legislators	67	5.9	12.9	4	1
11-2000	Advertising, marketing, promotions, public relations, and sales managers	700	12.8	18.3	101	13
11-2011	Advertising and promotions managers	85	13.2	18.1	13	2
11-2020	Marketing and sales managers	546	12.8	18.5	79	10
11-2021	Marketing managers	203	12.8	18.5	29	4
11-2022	Sales managers	343	12.8	18.5	51	6
11-2031	Public relations managers	69	11.9	17.3	9	1
11-3000	Operations specialties managers	1,807	9.8	17.4	194	31
11-3011	Administrative services managers	321	10.5	19.4	37	6
11-3021	Computer and information systems managers	284	10.2	18.2	34	5
11-3031	Financial managers	599	10.0	14.3	66	9
11-3040	Human resources managers	202	8.5	16.9	19	3
11-3051	Industrial production managers	182	9.3	19.3	18	4
11-3061	Purchasing managers	108	7.6	21.7	8	2
11-3071	Transportation, storage, and distribution managers	111	9.9	19.5	12	2
11-9000	Other management occupations	4,880	10.9	16.2	543	79
11-9010	Agricultural managers	1,376	10.4	7.7	131	11
11-9011	Farm, ranch, and other agricultural managers	218	11.2	17.2	25	4
11-9012	Farmers and ranchers	1,158	10.2	5.9	106	7
11-9021	Construction managers	389	10.8	18.1	45	7
11-9030	Education administrators	427	12.3	24.8	59	11
11-9031	Education administrators, preschool and child care center/program	58	12.3	24.8	8	1
11-9032	Education administrators, elementary and secondary school	217	12.3	24.8	29	5
11-9033	Education administrators, postsecondary	125	12.3	24.8	17	3
11-9039	Education administrators, all other	27	12.3	24.8	4	1
11-9041	Engineering managers	212	6.7	19.9	15	4
11-9051	Food service managers	386	14.0	16.3	57	6
11-9061	Funeral directors ¹	24	10.5	28.5	3	1
11-9071	Gaming managers	6	12.9	18.8	1	(²)
11-9081	Lodging managers	69	14.2	16.6	10	1
11-9111	Medical and health services managers ¹	244	10.5	19.5	29	5
11-9121	Natural sciences managers	45	9.8	19.2	5	1
11-9131	Postmasters and mail superintendents	25	10.9	18.9	3	(²)
11-9141	Property, real estate, and community association managers	293	10.6	18.7	33	5
11-9151	Social and community service managers	129	12.3	19.2	18	2
11-9199	All other managers	1,256	10.5	19.5	135	24
13-0000	Business and financial operations occupations	5,445	11.5	17.7	691	97
13-1000	Business operations specialists	3,177	12.3	17.7	435	56
13-1011	Agents and business managers of artists, performers, and athletes	15	11.9	19.7	2	(²)
13-1020	Buyers and purchasing agents	419	12.4	25.8	54	11
13-1021	Purchasing agents and buyers, farm products	19	10.3	34.1	2	1
13-1022	Wholesale and retail buyers, except farm products	155	15.1	26.2	24	4
13-1023	Purchasing agents, except wholesale, retail, and farm products	245	10.9	24.9	28	6
13-1030	Claims adjusters, appraisers, examiners, and investigators	241	12.1	12.3	31	3
13-1031	Claims adjusters, examiners, and investigators	227	12.1	12.3	29	3
13-1032	Insurance appraisers, auto damage	14	12.1	12.3	2	(²)
13-1041	Compliance officers, except agriculture, construction, health and safety, and transportation	158	11.9	23.5	20	4
13-1051	Cost estimators	188	11.5	22.4	24	4
13-1061	Emergency management specialists	11	11.0	22.0	1	(²)
13-1070	Human resources, training, and labor relations specialists	474	13.8	15.3	74	7
13-1071	Employment, recruitment, and placement specialists	175	13.8	15.3	27	3
13-1072	Compensation, benefits, and job analysis specialists	91	13.8	15.3	14	1

See footnotes at end of table.

Table V-5. Total and net replacement rates and annual average replacement needs, 2002-12—Continued

(Numbers in thousands)

2002 national employment matrix occupation		Total employment, 2002	Replacement rate (Percent)		Annual average replacement needs, 2002-12	
			Total, 2001-02	Net, 2002-12	Total	Net
13-1073	Training and development specialists	209	13.8	15.3	33	3
13-1111	Management analysts ¹	577	10.5	13.7	70	8
13-1121	Meeting and convention planners	37	16.4	21.8	7	1
13-1198	All other business operations specialists	1,056	12.6	17.0	152	18
13-2000	Financial specialists	2,268	10.3	17.8	256	40
13-2011	Accountants and auditors	1,055	9.3	18.9	108	20
13-2021	Appraisers and assessors of real estate	88	10.2	21.4	10	2
13-2031	Budget analysts	62	11.5	16.3	8	1
13-2041	Credit analysts	66	11.3	15.6	8	1
13-2050	Financial analysts and advisors	400	10.7	15.0	48	6
13-2051	Financial analysts	172	10.6	14.8	20	3
13-2052	Personal financial advisors	126	11.0	13.0	16	2
13-2053	Insurance underwriters	102	10.5	17.7	11	2
13-2061	Financial examiners	25	12.8	22.8	3	1
13-2070	Loan counselors and officers	255	11.6	16.1	32	4
13-2071	Loan counselors	31	11.6	16.1	4	(²)
13-2072	Loan officers	223	11.6	16.1	28	4
13-2080	Tax examiners, collectors, preparers, and revenue agents	154	10.9	19.6	18	3
13-2081	Tax examiners, collectors, and revenue agents	75	10.9	22.9	8	2
13-2082	Tax preparers	79	11.0	16.5	10	1
13-2099	All other financial specialists	162	12.0	17.6	21	3
15-2900	Professional and related occupations	27,687	10.8	19.2	3,324	532
15-0000	Computer and mathematical science occupations	3,018	9.8	13.7	347	41
15-1000	Computer specialists	2,911	9.8	13.2	336	39
15-1011	Computer and information scientists, research	23	10.5	11.3	3	(²)
15-1021	Computer programmers	499	7.6	23.6	40	12
15-1030	Computer software engineers	675	9.4	9.9	78	7
15-1031	Computer software engineers, applications	394	9.4	9.9	45	4
15-1032	Computer software engineers, systems software	281	9.4	9.9	32	3
15-1041	Computer support specialists	507	11.0	12.3	64	6
15-1051	Computer systems analysts	468	10.5	11.3	59	5
15-1061	Database administrators	110	10.4	10.3	14	1
15-1071	Network and computer systems administrators	251	10.1	11.1	30	3
15-1081	Network systems and data communications analysts	186	9.6	11.8	23	2
15-1099	All other computer specialists	192	10.5	11.3	24	2
15-2000	Mathematical science occupations	107	10.1	26.3	11	3
15-2011	Actuaries ¹	15	10.5	42.7	2	1
15-2021	Mathematicians ¹	3	10.5	44.0	(²)	(²)
15-2031	Operations research analysts	62	9.9	21.9	6	1
15-2041	Statisticians ¹	20	10.5	26.3	2	1
15-2090	Miscellaneous mathematical science occupations ¹	7	10.4	22.7	1	(²)
17-0000	Architecture and engineering occupations	2,587	8.5	22.2	229	57
17-1000	Architects, surveyors, and cartographers	204	7.1	19.0	16	4
17-1010	Architects, except naval	136	5.6	11.4	8	2
17-1011	Architects, except landscape and naval	113	5.6	11.4	7	1
17-1012	Landscape architects	23	5.6	11.4	1	(²)
17-1020	Surveyors, cartographers, and photogrammetrists	64	10.5	34.2	7	2
17-1021	Cartographers and photogrammetrists	9	10.5	34.2	1	(²)
17-1022	Surveyors	56	10.5	34.2	6	2
17-1099	All other architects, surveyors, and cartographers	3	10.5	34.2	(²)	(²)
17-2000	Engineers	1,478	6.9	21.4	106	32
17-2011	Aerospace engineers ¹	78	6.1	24.8	5	2
17-2021	Agricultural engineers	3	6.1	32.9	(²)	(²)
17-2031	Biomedical engineers	8	3.7	17.0	(²)	(²)
17-2041	Chemical engineers ¹	33	6.2	29.9	2	1
17-2051	Civil engineers	228	6.5	15.9	16	4
17-2061	Computer hardware engineers	74	7.7	16.7	6	1
17-2070	Electrical and electronics engineers	292	7.0	19.7	21	6
17-2071	Electrical engineers	156	7.0	19.7	11	3
17-2072	Electronics engineers, except computer	136	7.0	19.7	10	3

See footnotes at end of table.

Table V–5. Total and net replacement rates and annual average replacement needs, 2002–12—Continued

(Numbers in thousands)

2002 national employment matrix occupation		Total employment, 2002	Replacement rate (Percent)		Annual average replacement needs, 2002–12	
			Total, 2001–02	Net, 2002–12	Total	Net
17-2081	Environmental engineers	47	9.8	17.0	6	1
17-2110	Industrial engineers, including health and safety	194	9.1	24.2	19	5
17-2111	Health and safety engineers, except mining safety engineers and inspectors	36	9.1	24.2	3	1
17-2112	Industrial engineers	158	9.1	24.2	15	4
17-2121	Marine engineers and naval architects ¹	5	6.3	47.2	(²)	(²)
17-2131	Materials engineers	24	6.5	26.3	2	1
17-2141	Mechanical engineers	215	5.9	27.3	13	6
17-2151	Mining and geological engineers, including mining safety engineers	5	6.1	28.9	(²)	(²)
17-2161	Nuclear engineers ¹	16	6.1	29.9	1	(²)
17-2171	Petroleum engineers ¹	14	6.2	31.8	1	(²)
17-2199	All other engineers	243	6.0	19.0	15	5
17-3000	Drafters, engineering, and mapping technicians	905	11.4	24.2	108	22
17-3010	Drafters	216	12.6	28.1	28	6
17-3011	Architectural and civil drafters	106	12.6	28.1	14	3
17-3012	Electrical and electronics drafters	38	12.6	28.1	5	1
17-3013	Mechanical drafters	72	12.6	28.1	9	2
17-3020	Engineering technicians, except drafters	478	10.6	20.9	53	10
17-3021	Aerospace engineering and operations technicians	15	10.6	20.9	2	(²)
17-3022	Civil engineering technicians	92	10.6	20.9	10	2
17-3023	Electrical and electronic engineering technicians	204	10.6	20.9	23	4
17-3024	Electro-mechanical technicians	31	10.6	20.9	4	1
17-3025	Environmental engineering technicians	19	10.6	20.9	2	(²)
17-3026	Industrial engineering technicians	62	10.6	20.9	7	1
17-3027	Mechanical engineering technicians	55	10.6	20.9	6	1
17-3031	Surveying and mapping technicians	60	13.6	36.4	9	2
17-3099	All other drafters, engineering, and mapping technicians	150	11.2	24.1	18	4
19-0000	Life, physical, and social science occupations	1,237	9.7	24.1	131	30
19-1000	Life scientists	214	7.2	24.2	17	5
19-1010	Agricultural and food scientists ¹	18	7.5	17.8	1	(²)
19-1020	Biological scientists	75	7.1	31.3	6	2
19-1021	Biochemists and biophysicists	17	7.1	31.3	1	1
19-1022	Microbiologists	16	7.1	31.3	1	1
19-1023	Zoologists and wildlife biologists	15	7.1	31.3	1	(²)
19-1029	Biological scientists, all other	27	7.1	31.3	2	1
19-1030	Conservation scientists and foresters	33	6.5	29.2	2	1
19-1031	Conservation scientists ¹	19	6.5	29.2	1	1
19-1032	Foresters ¹	14	6.5	29.2	1	(²)
19-1040	Medical scientists	62	7.4	17.6	5	1
19-1041	Epidemiologists ¹	4	7.4	17.6	(²)	(²)
19-1042	Medical scientists, except epidemiologists ¹	58	7.4	17.6	5	1
19-1099	All other life scientists ¹	26	7.4	17.6	2	(²)
19-2000	Physical scientists	251	6.9	25.4	19	6
19-2010	Astronomers and physicists	14	6.5	32.4	1	(²)
19-2011	Astronomers ¹	1	6.5	32.4	(²)	(²)
19-2012	Physicists ¹	13	6.5	32.4	1	(²)
19-2021	Atmospheric and space scientists ¹	8	6.4	39.3	1	(²)
19-2030	Chemists and materials scientists	91	7.2	32.7	7	3
19-2031	Chemists	84	7.2	32.7	6	3
19-2032	Materials scientists	7	7.2	32.7	1	(²)
19-2040	Environmental scientists and geoscientists	101	6.7	17.8	7	2
19-2041	Environmental scientists and specialists, including health	65	6.7	17.8	5	1
19-2042	Geoscientists, except hydrologists and geographers	28	6.7	17.8	2	(²)
19-2043	Hydrologists	8	6.7	17.8	1	(²)
19-2099	All other physical scientists	37	7.3	22.8	3	1
19-3000	Social scientists and related occupations	426	10.8	24.4	51	10
19-3011	Economists	16	10.0	29.0	2	(²)
19-3020	Market and survey researchers	155	10.7	25.9	19	4
19-3021	Market research analysts	134	10.7	25.9	16	3
19-3022	Survey researchers	20	10.7	25.9	3	1
19-3030	Psychologists	139	10.0	21.8	16	3
19-3031	Clinical, counseling, and school psychologists	137	10.0	21.8	15	3
19-3032	Industrial-organizational psychologists	2	10.0	21.8	(²)	(²)
19-3041	Sociologists ¹	3	13.0	35.1	(²)	(²)

See footnotes at end of table.

Table V-5. Total and net replacement rates and annual average replacement needs, 2002-12—Continued

(Numbers in thousands)

2002 national employment matrix occupation		Total employment, 2002	Replacement rate (Percent)		Annual average replacement needs, 2002-12	
			Total, 2001-02	Net, 2002-12	Total	Net
19-3051	Urban and regional planners ¹	32	12.9	33.4	4	1
19-3090	Miscellaneous social scientists and related workers	14	12.0	20.2	2	(²)
19-3091	Anthropologists and archeologists ¹	5	12.0	20.2	1	(²)
19-3092	Geographers ¹	1	12.0	20.2	(²)	(²)
19-3093	Historians ¹	2	12.0	20.2	(²)	(²)
19-3094	Political scientists ¹	6	12.0	20.2	1	(²)
19-3098	All other social scientists and related workers	68	11.7	21.2	8	1
19-4000	Life, physical, and social science technicians	346	12.0	22.8	45	8
19-4011	Agricultural and food science technicians	20	13.9	19.3	3	(²)
19-4021	Biological technicians ¹	48	13.4	16.9	7	1
19-4031	Chemical technicians	69	12.0	24.9	8	2
19-4041	Geological and petroleum technicians	11	9.6	25.5	1	(²)
19-4051	Nuclear technicians	6	12.1	26.9	1	(²)
19-4090	Other life, physical, and social science technicians	55	11.7	23.5	7	1
19-4091	Environmental science and protection technicians, including health	28	11.7	23.5	4	1
19-4092	Forensic science technicians	8	11.7	23.5	1	(²)
19-4093	Forest and conservation technicians	19	11.7	23.5	2	(²)
19-4098	All other life, physical, and social science technicians	137	11.7	23.5	17	3
21-0000	Community and social services occupations	2,190	12.7	19.1	314	42
21-1000	Counselors, social workers, and other community and social service specialists	1,436	14.0	19.4	231	28
21-1010	Counselors	526	12.5	22.8	73	12
21-1011	Substance abuse and behavioral disorder counselors	67	12.5	22.8	9	2
21-1012	Educational, vocational, and school counselors	228	12.5	22.8	31	5
21-1013	Marriage and family therapists	23	12.5	22.8	3	1
21-1014	Mental health counselors	85	12.5	22.8	12	2
21-1015	Rehabilitation counselors	122	12.5	22.8	18	3
21-1020	Social workers	477	14.1	17.1	76	8
21-1021	Child, family, and school social workers	274	14.1	17.1	43	5
21-1022	Medical and public health social workers	107	14.1	17.1	17	2
21-1023	Mental health and substance abuse social workers	95	14.1	17.1	16	2
21-1090	Miscellaneous community and social service specialists	434	15.7	17.6	82	8
21-1091	Health educators	45	15.7	17.6	8	1
21-1092	Probation officers and correctional treatment specialists	84	15.7	17.6	14	1
21-1093	Social and human service assistants	305	15.7	17.6	60	5
21-2000	Religious workers	506	8.1	18.5	44	9
21-2011	Clergy	400	6.9	20.5	30	8
21-2021	Directors, religious activities and education ¹	105	12.6	11.0	15	1
21-9099	All other counselors, social, and religious workers	248	13.5	18.7	38	5
23-0000	Legal occupations	1,168	7.9	11.7	100	14
23-1000	Lawyers, judges, and related workers	747	5.9	12.9	47	10
23-1011	Lawyers	695	5.9	12.9	44	9
23-1020	Judges, magistrates, and other judicial workers	51	5.9	12.9	3	1
23-1021	Administrative law judges, adjudicators, and hearing officers	19	5.9	12.9	1	(²)
23-1022	Arbitrators, mediators, and conciliators	6	5.9	12.9	(²)	(²)
23-1023	Judges, magistrate judges, and magistrates	27	5.9	12.9	2	(²)
23-2000	Legal support workers	320	11.5	9.1	40	3
23-2011	Paralegals and legal assistants	200	11.6	8.0	26	2
23-2090	Miscellaneous legal support workers	121	11.4	10.9	14	1
23-2091	Court reporters	18	11.4	10.9	2	(²)
23-2092	Law clerks	48	11.4	10.9	6	1
23-2093	Title examiners, abstractors, and searchers	55	11.4	10.9	6	1
23-9099	All other legal and related workers	101	11.4	10.9	12	1
25-0000	Education, training, and library occupations	8,530	12.8	20.9	1,225	178
25-1000	Postsecondary teachers	1,581	9.8	22.6	185	36
25-2000	Primary, secondary, and special education teachers	4,187	11.6	22.4	534	94
25-2010	Preschool and kindergarten teachers	592	17.2	11.9	119	7
25-2011	Preschool teachers, except special education	424	17.2	11.9	86	5
25-2012	Kindergarten teachers, except special education	168	17.2	11.9	33	2
25-2020	Elementary and middle school teachers	2,070	11.0	22.1	242	46

See footnotes at end of table.

Table V–5. Total and net replacement rates and annual average replacement needs, 2002–12—Continued

(Numbers in thousands)

2002 national employment matrix occupation		Total employment, 2002	Replacement rate (Percent)		Annual average replacement needs, 2002–12	
			Total, 2001–02	Net, 2002–12	Total	Net
25-2021	Elementary school teachers, except special education	1,467	11.0	22.1	173	32
25-2022	Middle school teachers, except special and vocational education	585	11.0	22.1	67	13
25-2023	Vocational education teachers, middle school	18	11.0	22.1	2	(²)
25-2030	Secondary school teachers	1,093	10.1	28.1	120	31
25-2031	Secondary school teachers, except special and vocational education	988	10.1	28.1	109	28
25-2032	Vocational education teachers, secondary school	105	10.1	28.1	11	3
25-2040	Special education teachers	433	10.5	23.8	52	10
25-3000	Other teachers and instructors	960	15.6	12.3	175	12
25-3011	Adult literacy, remedial education, and GED teachers and instructors	80	15.6	12.3	14	1
25-3021	Self-enrichment education teachers	200	15.6	12.3	37	2
25-3999	All other teachers, primary, secondary, and adult	679	15.6	12.3	123	8
25-4000	Librarians, curators, and archivists	309	11.6	28.8	38	9
25-4010	Archivists, curators, and museum technicians ¹	22	9.3	22.0	2	(²)
25-4021	Librarians	167	8.0	23.9	14	4
25-4031	Library technicians	119	17.0	36.9	22	4
25-9000	Other education, training, and library occupations	1,493	17.6	18.7	293	28
25-9011	Audio-visual collections specialists	10	15.4	15.2	2	(²)
25-9021	Farm and home management advisors	16	15.4	15.2	3	(²)
25-9031	Instructional coordinators	98	15.4	15.2	17	1
25-9041	Teacher assistants	1,277	18.0	19.3	256	25
25-9199	All other library, museum, training, and other education workers	93	15.4	15.2	16	1
27-0000	Arts, design, entertainment, sports, and media occupations	2,377	12.8	18.8	329	45
27-1000	Art and design occupations	775	12.1	15.5	101	12
27-1010	Artists and related workers	149	13.9	21.7	22	3
27-1011	Art directors	51	13.9	21.7	7	1
27-1013	Fine artists, including painters, sculptors, and illustrators	23	13.9	21.7	3	1
27-1014	Multi-media artists and animators	75	13.9	21.7	11	2
27-1020	Designers	532	11.4	13.4	66	7
27-1021	Commercial and industrial designers	52	11.4	13.4	6	1
27-1022	Fashion designers	15	11.4	13.4	2	(²)
27-1023	Floral designers	104	11.4	13.4	13	1
27-1024	Graphic designers	212	11.4	13.4	27	3
27-1025	Interior designers	60	11.4	13.4	8	1
27-1026	Merchandise displayers and window trimmers	77	11.4	13.4	9	1
27-1027	Set and exhibit designers	12	11.4	13.4	2	(²)
27-1099	All other art and design workers	95	13.1	17.8	13	2
27-2000	Entertainers and performers, sports and related occupations	606	14.4	20.6	95	12
27-2010	Actors, producers, and directors	139	11.6	13.9	18	2
27-2011	Actors ¹	63	11.7	12.7	8	1
27-2012	Producers and directors ¹	76	11.5	15.0	10	1
27-2020	Athletes, coaches, umpires, and related workers	158	17.8	19.2	31	3
27-2021	Athletes and sports competitors	15	17.8	19.2	3	(²)
27-2022	Coaches and scouts	130	17.8	19.2	25	2
27-2023	Umpires, referees, and other sports officials	14	17.8	19.2	3	(²)
27-2030	Dancers and choreographers	37	14.9	61.5	6	2
27-2031	Dancers ¹	20	14.9	61.5	3	1
27-2032	Choreographers ¹	17	14.9	61.5	3	1
27-2040	Musicians, singers, and related workers	215	13.5	21.0	32	5
27-2041	Music directors and composers	54	13.5	21.0	8	1
27-2042	Musicians and singers	161	13.5	21.0	24	3
27-2099	All other entertainers and performers, sports and related workers ¹	56	14.8	12.2	9	1
27-3000	Media and communication occupations	700	12.6	19.6	95	14
27-3010	Announcers	76	11.1	25.3	8	2
27-3020	News analysts, reporters and correspondents	66	9.2	24.2	6	2
27-3031	Public relations specialists	158	14.7	14.4	27	2
27-3040	Writers and editors	319	11.8	21.9	41	7
27-3041	Editors	130	9.4	24.2	13	3
27-3042	Technical writers	50	8.5	28.8	5	1
27-3043	Writers and authors	139	15.2	17.2	23	2
27-3090	Miscellaneous media and communications workers	82	14.9	12.1	13	1
27-3091	Interpreters and translators ¹	24	14.9	12.1	4	(²)

See footnotes at end of table.

Table V–5. Total and net replacement rates and annual average replacement needs, 2002–12—Continued

(Numbers in thousands)

2002 national employment matrix occupation		Total employment, 2002	Replacement rate (Percent)		Annual average replacement needs, 2002–12	
			Total, 2001–02	Net, 2002–12	Total	Net
27-3099	All other media and communication workers ¹	58	14.9	12.1	9	1
27-4000	Media and communication equipment occupations	295	11.9	21.9	38	6
27-4010	Broadcast and sound engineering technicians and radio operators	93	9.2	24.5	9	2
27-4011	Audio and video equipment technicians	42	9.2	24.5	4	1
27-4012	Broadcast technicians	35	9.2	24.5	3	1
27-4013	Radio operators	3	9.2	24.5	(²)	(²)
27-4014	Sound engineering technicians	13	9.2	24.5	1	(²)
27-4021	Photographers	130	12.6	20.4	18	3
27-4030	Television, video, and motion picture camera operators and editors	48	11.2	21.2	6	1
27-4031	Camera operators, television, video, and motion picture	28	11.2	21.2	3	1
27-4032	Film and video editors	19	11.2	21.2	2	(²)
27-4099	All other media and communication equipment workers	24	20.2	21.3	5	1
29-0000	Healthcare practitioners and technical occupations	6,580	8.7	19.0	649	125
29-1000	Health diagnosing and treating practitioners	4,071	6.5	19.5	298	80
29-1011	Chiropractors ¹	49	4.0	18.9	2	1
29-1020	Dentists ¹	153	4.0	16.8	6	3
29-1031	Dietitians and nutritionists	49	14.6	26.0	8	1
29-1041	Optometrists ¹	32	3.9	27.7	1	1
29-1051	Pharmacists ¹	230	6.9	19.4	18	4
29-1060	Physicians and surgeons	583	4.6	13.4	29	8
29-1071	Physician assistants ¹	63	6.3	15.4	5	1
29-1081	Podiatrists ¹	13	3.9	24.3	1	(²)
29-1111	Registered nurses	2,284	6.7	20.9	173	48
29-1120	Therapists	450	8.3	19.6	43	9
29-1121	Audiologists ¹	11	8.4	24.2	1	(²)
29-1122	Occupational therapists ¹	82	8.2	13.5	8	1
29-1123	Physical therapists ¹	137	8.3	9.8	13	1
29-1124	Radiation therapists ¹	14	7.4	22.8	1	(²)
29-1125	Recreational therapists ¹	27	8.7	23.9	2	1
29-1126	Respiratory therapists ¹	86	8.2	32.9	8	3
29-1127	Speech-language pathologists ¹	94	8.3	24.9	9	2
29-1131	Veterinarians ¹	58	4.0	24.1	3	1
29-1198	All other health diagnosing and treating practitioners ¹	107	6.7	21.7	8	2
29-2000	Health technologists and technicians	2,263	12.2	18.1	313	41
29-2010	Clinical laboratory technologists and technicians	297	12.0	26.9	39	8
29-2011	Medical and clinical laboratory technologists	150	12.0	26.9	20	4
29-2012	Medical and clinical laboratory technicians	147	12.0	26.9	19	4
29-2021	Dental hygienists	148	1.8	8.5	3	1
29-2030	Diagnostic related technologists and technicians	271	9.7	18.7	29	5
29-2031	Cardiovascular technologists and technicians	43	9.7	18.7	5	1
29-2032	Diagnostic medical sonographers	37	9.7	18.7	4	1
29-2033	Nuclear medicine technologists	17	9.7	18.7	2	(²)
29-2034	Radiologic technologists and technicians	174	9.7	18.7	19	3
29-2041	Emergency medical technicians and paramedics	179	14.4	11.5	30	2
29-2050	Health diagnosing and treating practitioner support technicians	451	15.6	13.0	80	6
29-2051	Dietetic technicians ¹	29	15.6	13.0	5	(²)
29-2052	Pharmacy technicians ¹	211	15.6	13.0	38	3
29-2053	Psychiatric technicians ¹	60	15.6	13.0	10	1
29-2054	Respiratory therapy technicians ¹	26	15.6	13.0	5	(²)
29-2055	Surgical technologists ¹	72	15.6	13.0	13	1
29-2056	Veterinary technologists and technicians ¹	53	15.6	13.0	10	1
29-2061	Licensed practical and licensed vocational nurses	702	13.0	21.8	100	15
29-2071	Medical records and health information technicians	147	11.6	14.3	21	2
29-2081	Opticians, dispensing ¹	63	13.7	17.5	9	1
29-2090	Miscellaneous health technologists and technicians	5	12.9	16.2	1	(²)
29-2091	Orthotists and prosthetists	5	12.9	16.2	1	(²)
29-9000	Other healthcare practitioners and technical occupations	56	14.3	21.7	9	1
29-9010	Occupational health and safety specialists and technicians	41	14.3	21.7	6	1
29-9090	Miscellaneous health practitioners and technical workers	14	14.3	21.7	2	(²)
29-9091	Athletic trainers	14	14.3	21.7	2	(²)
29-9199	All other health practitioners and technical workers	190	13.5	18.1	29	3

See footnotes at end of table.

Table V–5. Total and net replacement rates and annual average replacement needs, 2002–12—Continued

(Numbers in thousands)

2002 national employment matrix occupation		Total employment, 2002	Replacement rate (Percent)		Annual average replacement needs, 2002–12	
			Total, 2001–02	Net, 2002–12	Total	Net
31-3900	Service occupations	26,569	22.8	28.7	6,671	762
31-0000	Healthcare support occupations	3,310	17.5	15.9	681	53
31-1000	Nursing, psychiatric, and home health aides	2,014	19.5	13.1	454	26
31-1011	Home health aides	580	19.5	13.1	140	8
31-1012	Nursing aides, orderlies, and attendants	1,375	19.5	13.1	302	18
31-1013	Psychiatric aides	59	19.5	13.1	12	1
31-2000	Occupational and physical therapist assistants and aides	114	15.1	15.7	21	2
31-2010	Occupational therapist assistants and aides	27	11.1	12.7	4	(²)
31-2011	Occupational therapist assistants ¹	18	11.1	12.7	2	(²)
31-2012	Occupational therapist aides ¹	8	11.1	12.7	1	(²)
31-2020	Physical therapist assistants and aides	87	16.3	16.7	17	1
31-2021	Physical therapist assistants ¹	50	16.3	16.7	10	1
31-2022	Physical therapist aides ¹	37	16.3	16.7	7	1
31-9000	Other healthcare support occupations	1,182	14.6	20.7	206	24
31-9011	Massage therapists	92	23.0	19.4	24	2
31-9090	Miscellaneous healthcare support occupations	1,090	13.9	20.8	181	23
31-9091	Dental assistants	266	8.7	28.0	28	7
31-9092	Medical assistants	365	15.6	18.5	73	7
31-9093	Medical equipment preparers	36	15.6	18.5	6	1
31-9094	Medical transcriptionists	101	15.6	18.5	17	2
31-9095	Pharmacy aides	60	15.6	18.5	10	1
31-9096	Veterinary assistants and laboratory animal caretakers	63	15.6	18.5	11	1
31-9099	All other healthcare support workers	198	15.6	18.5	35	4
33-0000	Protective service occupations	3,116	14.1	28.2	492	88
33-1000	First-line supervisors/managers, protective service workers	266	10.4	32.9	30	9
33-1010	First-line supervisors/managers, law enforcement workers	147	10.4	32.2	17	5
33-1011	First-line supervisors/managers of correctional officers	33	10.3	29.5	4	1
33-1012	First-line supervisors/managers of police and detectives	114	10.5	33.0	13	4
33-1021	First-line supervisors/managers of fire fighting and prevention workers ¹	63	10.4	41.2	7	3
33-1099	All other first-line supervisors/managers, protective service workers	56	10.5	25.4	7	1
33-2000	Fire fighting and prevention workers	296	8.2	29.0	27	9
33-2011	Fire fighters	282	8.2	29.0	26	8
33-2020	Fire inspectors	14	8.7	28.5	1	(²)
33-3000	Law enforcement workers	1,179	8.8	23.9	116	28
33-3010	Bailiffs, correctional officers, and jailers	442	9.1	20.7	45	9
33-3011	Bailiffs	15	9.1	20.7	1	(²)
33-3012	Correctional officers and jailers	427	9.1	20.7	44	9
33-3021	Detectives and criminal investigators	94	9.7	26.8	10	3
33-3031	Fish and game wardens ¹	8	8.1	25.0	1	(²)
33-3041	Parking enforcement workers ¹	11	9.1	18.6	1	(²)
33-3050	Police officers	625	8.4	25.8	59	16
33-3051	Police and sheriff's patrol officers	619	8.4	25.9	58	16
33-3052	Transit and railroad police	6	11.4	18.9	1	(²)
33-9000	Other protective service workers	1,374	20.4	30.9	320	42
33-9011	Animal control workers	11	13.8	69.8	2	1
33-9021	Private detectives and investigators	48	16.3	21.1	9	1
33-9030	Security guards and gaming surveillance officers	1,004	19.7	21.8	229	22
33-9031	Gaming surveillance officers and gaming investigators	9	19.7	21.8	2	(²)
33-9032	Security guards	995	19.7	21.8	227	22
33-9091	Crossing guards ¹	74	24.5	32.2	20	2
33-9095	All other protective service workers	237	23.7	69.3	60	16
35-0000	Food preparation and serving related occupations	10,200	30.3	39.7	3,338	405
35-1000	Supervisors, food preparation and serving workers	824	21.2	24.7	188	20
35-1011	Chefs and head cooks	132	23.5	29.6	33	4
35-1012	First-line supervisors/managers of food preparation and serving workers	692	20.7	23.8	155	16
35-2000	Cooks and food preparation workers	2,836	28.1	32.3	845	92
35-2010	Cooks	1,986	27.5	31.0	570	61

See footnotes at end of table.

Table V–5. Total and net replacement rates and annual average replacement needs, 2002–12—Continued

(Numbers in thousands)

2002 national employment matrix occupation		Total employment, 2002	Replacement rate (Percent)		Annual average replacement needs, 2002–12	
			Total, 2001–02	Net, 2002–12	Total	Net
35-2011	Cooks, fast food	588	27.5	31.0	166	18
35-2012	Cooks, institution and cafeteria	436	27.5	31.0	121	13
35-2013	Cooks, private household	8	27.5	31.0	2	(²)
35-2014	Cooks, restaurant	727	27.5	31.0	216	23
35-2015	Cooks, short order	227	27.5	31.0	65	7
35-2021	Food preparation workers	850	29.4	35.4	275	30
35-3000	Food and beverage serving workers	5,211	32.6	47.9	1,857	249
35-3011	Bartenders	463	20.8	39.5	100	18
35-3020	Fast food and counter workers	2,457	35.4	47.5	965	117
35-3021	Combined food preparation and serving workers, including fast food ¹	1,990	34.6	43.3	767	86
35-3022	Counter attendants, cafeteria, food concession, and coffee shop	467	39.0	65.3	198	30
35-3031	Waiters and waitresses	2,097	32.6	51.5	744	108
35-3041	Food servers, nonrestaurant	195	23.1	33.5	47	7
35-9000	Other food preparation and serving related workers	1,328	31.7	33.0	448	44
35-9011	Dining room and cafeteria attendants and bartender helpers	409	33.4	33.4	147	14
35-9021	Dishwashers	505	32.0	33.8	169	17
35-9031	Hosts and hostesses, restaurant, lounge, and coffee shop	298	30.3	31.8	98	9
35-9098	All other food preparation and serving related workers	117	27.5	31.1	35	4
37-0000	Building and grounds cleaning and maintenance occupations	5,485	18.5	20.0	1,096	110
37-1000	Supervisors, building and grounds cleaning and maintenance workers	380	10.3	18.0	43	7
37-1011	First-line supervisors/managers of housekeeping and janitorial workers	230	10.7	23.6	27	5
37-1012	First-line supervisors/managers of landscaping, lawn service, and groundskeeping workers	150	9.7	9.3	16	1
37-2000	Building cleaning and pest control workers	3,820	19.9	19.7	815	75
37-2010	Building cleaning workers	3,759	19.9	19.8	804	74
37-2011	Janitors and cleaners, except maids and housekeeping cleaners	2,267	18.2	19.0	450	43
37-2012	Maids and housekeeping cleaners	1,492	22.7	21.0	354	31
37-2021	Pest control workers ¹	62	15.9	15.1	11	1
37-3000	Grounds maintenance workers	1,285	16.8	21.6	238	28
37-3010	Grounds maintenance workers	1,160	16.7	21.8	215	25
37-3011	Landscaping and groundskeeping workers	1,074	16.7	21.8	199	23
37-3012	Pesticide handlers, sprayers, and applicators, vegetation	27	16.7	21.8	5	1
37-3013	Tree trimmers and pruners	59	16.7	21.8	11	1
37-9099	All other building and grounds cleaning and maintenance workers	125	17.3	20.5	23	3
39-0000	Personal care and service occupations	4,458	21.7	24.0	1,064	107
39-1000	Supervisors, personal care and service workers	276	11.7	24.2	34	7
39-1010	First-line supervisors/managers of gaming workers	60	13.7	21.0	9	1
39-1011	Gaming supervisors	39	13.7	21.0	6	1
39-1012	Slot key persons	21	13.7	21.0	3	(²)
39-1021	First-line supervisors/managers of personal service workers	216	11.2	25.1	25	5
39-2000	Animal care and service workers	151	21.8	24.1	36	4
39-2011	Animal trainers	26	15.4	20.6	4	1
39-2021	Nonfarm animal caretakers	125	23.1	24.9	32	3
39-3000	Entertainment attendants and related workers	507	26.3	35.7	149	18
39-3010	Gaming services workers	92	31.3	31.6	32	3
39-3011	Gaming dealers	78	31.3	31.6	27	2
39-3012	Gaming and sports book writers and runners	14	31.3	31.6	5	(²)
39-3021	Motion picture projectionists ¹	9	13.3	51.7	1	(²)
39-3031	Ushers, lobby attendants, and ticket takers ¹	105	24.2	57.0	27	6
39-3090	Miscellaneous entertainment attendants and related workers	261	25.6	28.8	76	8
39-3091	Amusement and recreation attendants	234	25.6	28.8	68	7
39-3092	Costume attendants	4	25.6	28.8	1	(²)
39-3093	Locker room, coatroom, and dressing room attendants	23	25.6	28.8	7	1
39-3199	All other gaming service workers	40	28.1	30.4	12	1
39-4000	Funeral service workers	33	11.0	20.9	4	1
39-4011	Embalmers	7	11.0	20.9	1	(²)
39-4021	Funeral attendants	26	11.0	20.9	3	1

See footnotes at end of table.

Table V–5. Total and net replacement rates and annual average replacement needs, 2002–12—Continued

(Numbers in thousands)

2002 national employment matrix occupation		Total employment, 2002	Replacement rate (Percent)		Annual average replacement needs, 2002–12	
			Total, 2001–02	Net, 2002–12	Total	Net
39-5000	Personal appearance workers	754	10.3	20.0	83	15
39-5010	Barbers and cosmetologists	651	10.2	20.1	71	13
39-5011	Barbers	66	10.3	28.1	7	2
39-5012	Hairdressers, hairstylists, and cosmetologists	585	10.2	19.3	64	11
39-5090	Miscellaneous personal appearance workers	103	10.6	19.4	12	2
39-5091	Makeup artists, theatrical and performance	2	10.6	19.4	(²)	(²)
39-5092	Manicurists and pedicurists	51	10.6	19.4	6	1
39-5093	Shampooers	25	10.6	19.4	3	(²)
39-5094	Skin care specialists	25	10.6	19.4	3	(²)
39-6000	Transportation, tourism, and lodging attendants	248	22.4	19.3	60	5
39-6010	Baggage porters, bellhops, and concierges	75	24.4	26.4	20	2
39-6011	Baggage porters and bellhops ¹	58	24.4	26.4	15	2
39-6012	Concierges ¹	17	24.4	26.4	4	(²)
39-6020	Tour and travel guides	43	24.3	26.5	11	1
39-6021	Tour guides and escorts ¹	36	24.3	26.5	9	1
39-6022	Travel guides ¹	6	24.3	26.5	2	(²)
39-6030	Transportation attendants	130	20.6	12.8	29	2
39-6031	Flight attendants ¹	104	20.6	12.8	23	1
39-6032	Transportation attendants, except flight attendants and baggage porters ¹	26	20.6	12.8	6	(²)
39-9000	Other personal care and service workers	2,490	25.1	23.2	698	58
39-9011	Child care workers	1,211	32.3	27.2	414	33
39-9021	Personal and home care aides	608	21.4	16.0	156	10
39-9030	Recreation and fitness workers	485	16.4	22.9	91	11
39-9031	Fitness trainers and aerobics instructors	183	16.4	22.9	37	4
39-9032	Recreation workers	302	16.4	22.9	54	7
39-9041	Residential advisors	53	19.1	21.1	12	1
39-9099	Personal care and service workers, all other	134	16.5	21.5	25	3
41-0000	Sales and related occupations	15,260	21.1	31.9	3,421	487
41-1000	Supervisors, sales workers	2,395	12.7	18.2	316	44
41-1011	First-line supervisors/managers of retail sales workers	1,798	13.1	18.0	246	32
41-1012	First-line supervisors/managers of non-retail sales workers	597	11.4	18.9	70	11
41-2000	Retail sales workers	8,224	28.1	41.4	2,476	341
41-2010	Cashiers	3,465	34.3	48.7	1,266	169
41-2011	Cashiers, except gaming	3,432	34.3	48.7	1,253	167
41-2012	Gaming change persons and booth cashiers	33	34.3	48.7	13	2
41-2020	Counter and rental clerks and parts salespersons	683	25.2	34.8	186	24
41-2021	Counter and rental clerks	436	30.3	38.3	149	17
41-2022	Parts salespersons	248	14.7	28.6	36	7
41-2031	Retail salespersons	4,076	23.4	36.4	1,025	148
41-3000	Sales representatives, services	957	12.4	19.0	124	18
41-3011	Advertising sales agents	157	13.8	19.4	23	3
41-3021	Insurance sales agents	381	12.7	23.9	51	9
41-3031	Securities, commodities, and financial services sales agents	300	11.6	11.3	37	3
41-3041	Travel agents ¹	118	11.8	22.4	13	3
41-4000	Sales representatives, wholesale and manufacturing	1,857	9.1	26.3	184	49
41-4011	Sales representatives, wholesale and manufacturing, technical and scientific products ¹	398	9.1	26.3	40	10
41-4012	Sales representatives, wholesale and manufacturing, except technical and scientific products ¹	1,459	9.1	26.3	145	38
41-9000	Other sales and related workers	1,827	16.8	19.8	321	36
41-9010	Models, demonstrators, and product promoters	179	20.3	22.2	39	4
41-9011	Demonstrators and product promoters	175	20.3	22.2	38	4
41-9012	Models	5	20.3	22.2	1	(²)
41-9020	Real estate brokers and sales agents	407	10.5	19.9	44	8
41-9021	Real estate brokers	99	10.5	19.9	11	2
41-9022	Real estate sales agents	308	10.5	19.9	33	6
41-9031	Sales engineers ¹	82	6.1	29.8	5	2
41-9041	Telemarketers	428	21.0	16.4	88	7

See footnotes at end of table.

Table V-5. Total and net replacement rates and annual average replacement needs, 2002-12—Continued

(Numbers in thousands)

2002 national employment matrix occupation		Total employment, 2002	Replacement rate (Percent)		Annual average replacement needs, 2002-12	
			Total, 2001-02	Net, 2002-12	Total	Net
41-9091	Door-to-door sales workers, news and street vendors, and related workers	155	25.2	23.6	37	4
41-9098	All other sales and related workers	577	16.6	19.0	108	11
43-0000	Office and administrative support occupations	23,851	16.7	22.9	4,118	545
43-1000	Supervisors, office and administrative support workers	1,459	8.9	21.5	135	31
43-1011	First-line supervisors/managers of office and administrative support workers	1,459	8.9	21.5	135	31
43-2000	Communications equipment operators	304	19.1	25.4	55	8
43-2011	Switchboard operators, including answering service	236	20.2	25.6	48	6
43-2021	Telephone operators	50	13.1	25.9	5	1
43-2099	All other communications equipment operators	18	16.3	21.4	3	(²)
43-3000	Financial clerks	3,726	15.3	23.5	589	88
43-3011	Bill and account collectors	413	15.9	18.8	74	8
43-3021	Billing and posting clerks and machine operators	507	14.7	17.0	77	9
43-3031	Bookkeeping, accounting, and auditing clerks	1,983	13.5	18.7	272	37
43-3041	Gaming cage workers	18	36.4	48.7	7	1
43-3051	Payroll and timekeeping clerks	198	9.1	26.4	19	5
43-3061	Procurement clerks	77	17.4	25.4	13	2
43-3071	Tellers	530	22.9	49.3	127	26
43-4000	Information and record clerks	5,394	20.5	21.3	1,198	115
43-4011	Brokerage clerks	78	12.8	13.3	9	1
43-4021	Correspondence clerks	33	20.0	29.7	7	1
43-4031	Court, municipal, and license clerks	106	11.8	22.2	13	2
43-4041	Credit authorizers, checkers, and clerks	80	19.3	19.2	15	2
43-4051	Customer service representatives	1,894	19.7	14.9	419	28
43-4061	Eligibility interviewers, government programs	94	12.6	26.7	11	3
43-4071	File clerks	265	23.4	29.7	62	8
43-4081	Hotel, motel, and resort desk clerks	178	23.7	44.9	47	8
43-4111	Interviewers, except eligibility and loan	193	20.8	25.8	46	5
43-4121	Library assistants, clerical	120	20.4	40.5	27	5
43-4131	Loan interviewers and clerks	170	18.3	13.7	29	2
43-4141	New accounts clerks	99	23.2	25.1	24	2
43-4151	Order clerks	330	18.6	22.5	60	7
43-4161	Human resources assistants, except payroll and timekeeping	174	18.7	21.5	36	4
43-4171	Receptionists and information clerks	1,100	23.9	24.6	302	27
43-4181	Reservation and transportation ticket agents and travel clerks ¹	177	18.7	26.1	35	5
43-4999	All other financial, information, and record clerks	304	18.6	15.7	57	5
43-5000	Material recording, scheduling, dispatching, and distributing occupations	4,005	19.0	29.4	763	118
43-5011	Cargo and freight agents	59	12.3	22.5	8	1
43-5021	Couriers and messengers	132	18.3	22.9	25	3
43-5030	Dispatchers	262	15.0	21.5	42	6
43-5031	Police, fire, and ambulance dispatchers	92	15.0	21.5	15	2
43-5032	Dispatchers, except police, fire, and ambulance	170	15.0	21.5	27	4
43-5041	Meter readers, utilities ¹	54	18.4	31.5	9	2
43-5050	Postal service workers	664	6.4	28.9	42	19
43-5051	Postal service clerks	77	6.9	26.4	5	2
43-5052	Postal service mail carriers ¹	334	6.0	31.3	20	10
43-5053	Postal service mail sorters, processors, and processing machine operators	253	6.9	26.4	17	7
43-5061	Production, planning, and expediting clerks ¹	288	16.4	24.2	50	7
43-5071	Shipping, receiving, and traffic clerks	803	18.9	20.5	154	16
43-5081	Stock clerks and order fillers	1,628	25.7	37.0	409	60
43-5111	Weighers, measurers, checkers, and samplers, recordkeeping	81	18.4	25.3	16	2
43-5199	All other material recording, scheduling, dispatching, and distributing workers	34	25.7	37.0	8	1
43-6000	Secretaries and administrative assistants	4,104	12.9	19.2	540	79
43-6011	Executive secretaries and administrative assistants	1,526	12.9	19.2	205	29
43-6012	Legal secretaries	264	12.9	19.2	37	5
43-6013	Medical secretaries	339	12.9	19.2	47	7
43-6014	Secretaries, except legal, medical, and executive	1,975	12.9	19.2	251	38
43-9000	Other office and administrative support workers	4,858	17.0	22.1	838	107

See footnotes at end of table.

Table V–5. Total and net replacement rates and annual average replacement needs, 2002–12—Continued

(Numbers in thousands)

2002 national employment matrix occupation		Total employment, 2002	Replacement rate (Percent)		Annual average replacement needs, 2002–12	
			Total, 2001–02	Net, 2002–12	Total	Net
43-9011	Computer operators	182	14.8	21.3	25	4
43-9020	Data entry and information processing workers	633	18.4	23.0	106	15
43-9021	Data entry keyers	392	18.3	23.6	70	9
43-9022	Word processors and typists	241	18.6	22.0	36	5
43-9031	Desktop publishers	35	9.5	22.6	4	1
43-9041	Insurance claims and policy processing clerks	266	14.9	16.1	40	4
43-9051	Mail clerks and mail machine operators, except postal service	170	17.0	29.9	29	5
43-9061	Office clerks, general	2,991	17.4	22.1	546	66
43-9071	Office machine operators, except computer	96	18.0	25.2	17	2
43-9081	Proofreaders and copy markers ¹	27	19.3	20.5	5	1
43-9111	Statistical assistants	23	10.6	16.0	2	(²)
43-9999	All other secretaries, administrative assistants, and other office support workers	435	14.7	21.2	64	9
45-0000	Farming, fishing, and forestry occupations	1,072	21.5	26.8	235	29
45-1000	Supervisors, farming, fishing, and forestry workers	52	10.8	22.9	6	1
45-2000	Agricultural workers	804	22.5	28.0	185	23
45-2011	Agricultural inspectors	16	21.8	24.3	4	(²)
45-2021	Animal breeders	9	7.2	16.7	1	(²)
45-2041	Graders and sorters, agricultural products	49	21.8	26.5	11	1
45-2090	Miscellaneous agricultural workers	731	22.7	28.3	169	21
45-2091	Agricultural equipment operators	61	22.7	28.3	14	2
45-2092	Farmworkers and laborers, crop, nursery, and greenhouse	617	22.7	28.3	143	17
45-2093	Farmworkers, farm and ranch animals	53	22.7	28.3	12	2
45-3000	Fishing and hunting workers	38	17.4	29.6	6	1
45-3011	Fishers and related fishing workers ¹	36	17.6	28.5	6	1
45-3021	Hunters and trappers ¹	1	12.9	57.9	(²)	(²)
45-4000	Forest, conservation, and logging workers	81	20.3	19.5	16	2
45-4011	Forest and conservation workers	14	17.8	24.6	3	(²)
45-4020	Logging workers	67	20.9	18.4	14	1
45-4021	Fallers	14	20.9	18.4	3	(²)
45-4022	Logging equipment operators	43	20.9	18.4	9	1
45-4023	Log graders and scalers	10	20.9	18.4	2	(²)
45-9099	All other farming, fishing, and forestry workers	96	22.2	24.1	22	2
47-0000	Construction and extraction occupations	7,292	12.8	19.8	1,000	145
47-1000	Supervisors, construction and extraction workers	633	9.2	17.0	63	11
47-1011	First-line supervisors/managers of construction trades and extraction workers ¹	633	9.2	17.0	63	11
47-2000	Construction trades and related workers	5,596	12.8	18.4	774	103
47-2011	Boilermakers ¹	25	6.2	36.4	2	1
47-2020	Brickmasons, blockmasons, and stonemasons	165	12.8	14.9	23	2
47-2021	Brickmasons and blockmasons ¹	148	12.8	14.9	20	2
47-2022	Stonemasons ¹	17	12.8	14.9	2	(²)
47-2031	Carpenters	1,209	14.9	16.3	190	20
47-2040	Carpet, floor, and tile installers and finishers	164	10.1	15.6	18	3
47-2041	Carpet installers	82	10.1	15.6	9	1
47-2042	Floor layers, except carpet, wood, and hard tiles	31	10.1	15.6	3	(²)
47-2043	Floor sanders and finishers	17	10.1	15.6	2	(²)
47-2044	Tile and marble setters	33	10.1	15.6	4	1
47-2050	Cement masons, concrete finishers, and terrazzo workers	188	10.7	20.1	23	4
47-2051	Cement masons and concrete finishers	182	10.7	20.1	22	4
47-2053	Terrazzo workers and finishers	6	10.7	20.1	1	(²)
47-2061	Construction laborers	938	16.3	13.3	163	12
47-2070	Construction equipment operators	416	12.0	24.0	52	10
47-2071	Paving, surfacing, and tamping equipment operators ¹	58	12.9	14.3	8	1
47-2072	Pile-driver operators	5	14.6	16.9	1	(²)
47-2073	Operating engineers and other construction equipment operators	353	11.8	25.7	44	9
47-2080	Drywall installers, ceiling tile installers, and tapers	176	10.4	21.7	20	4
47-2081	Drywall and ceiling tile installers	135	10.4	21.7	16	3
47-2082	Tapers	41	10.4	21.7	5	1
47-2111	Electricians	659	7.6	19.8	56	13

See footnotes at end of table.

Table V–5. Total and net replacement rates and annual average replacement needs, 2002–12—Continued

(Numbers in thousands)

2002 national employment matrix occupation		Total employment, 2002	Replacement rate (Percent)		Annual average replacement needs, 2002–12	
			Total, 2001–02	Net, 2002–12	Total	Net
47-2121	Glaziers ¹	49	12.8	20.9	7	1
47-2130	Insulation workers	53	14.6	30.2	8	2
47-2140	Painters and paperhangers	468	14.2	15.1	70	7
47-2141	Painters, construction and maintenance	448	14.3	15.2	68	7
47-2142	Paperhangers ¹	20	12.9	12.7	3	(²)
47-2150	Pipelayers, plumbers, pipefitters, and steamfitters	550	9.5	23.0	57	13
47-2151	Pipelayers	58	9.5	23.0	6	1
47-2152	Plumbers, pipefitters, and steamfitters	492	9.5	23.0	51	11
47-2161	Plasterers and stucco masons ¹	59	12.8	18.3	8	1
47-2171	Reinforcing iron and rebar workers	29	7.0	19.4	2	1
47-2181	Roofers	166	21.1	23.3	38	4
47-2211	Sheet metal workers	205	12.5	24.0	28	5
47-2221	Structural iron and steel workers	78	9.7	19.6	8	2
47-3000	Helpers, construction trades	431	15.4	41.5	71	18
47-3010	Helpers, construction trades	431	15.4	41.5	71	18
47-3011	Helpers—brickmasons, blockmasons, stonemasons, and tile and marble setters	59	15.4	41.5	9	2
47-3012	Helpers—carpenters	97	15.4	41.5	16	4
47-3013	Helpers—electricians	99	15.4	41.5	17	4
47-3014	Helpers—painters, paperhangers, plasterers, and stucco masons	31	15.4	41.5	5	1
47-3015	Helpers—pipelayers, plumbers, pipefitters, and steamfitters	79	15.4	41.5	13	3
47-3016	Helpers—roofers	21	15.4	41.5	4	1
47-3019	All other helpers, construction trades	44	15.4	41.5	7	2
47-4000	Other construction and related workers	354	13.8	19.1	52	7
47-4011	Construction and building inspectors ¹	84	10.1	22.5	9	2
47-4021	Elevator installers and repairers ¹	21	11.2	24.7	3	1
47-4031	Fence erectors	27	11.9	14.8	3	(²)
47-4041	Hazardous materials removal workers	38	16.7	26.4	8	1
47-4051	Highway maintenance workers	154	15.3	14.5	25	2
47-4061	Rail-track laying and maintenance equipment operators	11	14.0	22.6	1	(²)
47-4071	Septic tank servicers and sewer pipe cleaners	18	16.6	26.7	3	(²)
47-4090	Miscellaneous construction and related workers	2	12.0	16.0	(²)	(²)
47-4091	Segmental pavers	2	12.0	16.0	(²)	(²)
47-4999	All other construction trades and related workers	110	12.0	16.0	15	2
47-5000	Extraction workers	167	14.5	27.1	24	5
47-5010	Derrick, rotary drill, and service unit operators, oil, gas, and mining	41	11.8	29.0	5	1
47-5011	Derrick operators, oil and gas ¹	15	11.8	29.0	2	(²)
47-5012	Rotary drill operators, oil and gas ¹	14	11.8	29.0	2	(²)
47-5013	Service unit operators, oil, gas, and mining ¹	13	11.8	29.0	2	(²)
47-5021	Earth drillers, except oil and gas ¹	23	12.8	21.1	3	(²)
47-5031	Explosives workers, ordnance handling experts, and blasters ¹	5	15.5	38.1	1	(²)
47-5040	Mining machine operators	18	15.2	28.4	3	1
47-5041	Continuous mining machine operators ¹	8	15.2	28.4	1	(²)
47-5042	Mine cutting and channeling machine operators ¹	5	15.2	28.4	1	(²)
47-5049	All other mining machine operators ¹	4	15.2	28.4	1	(²)
47-5051	Rock splitters, quarry	3	13.0	24.7	(²)	(²)
47-5061	Roof bolters, mining ¹	4	17.0	18.2	1	(²)
47-5071	Roustabouts, oil and gas ¹	32	15.2	27.7	5	1
47-5081	Helpers—extraction workers ¹	29	18.7	28.2	6	1
47-5099	Extraction workers, all other	12	13.0	24.7	2	(²)
49-0000	Installation, maintenance, and repair occupations	5,696	10.5	22.9	638	131
49-1000	Supervisors of installation, maintenance, and repair workers	444	7.9	25.1	38	11
49-1011	First-line supervisors/managers of mechanics, installers, and repairers	444	7.9	25.1	38	11
49-2000	Electrical and electronic equipment mechanics, installers, and repairers	689	10.4	19.2	74	13
49-2011	Computer, automated teller, and office machine repairers	156	10.7	12.2	18	2
49-2020	Radio and telecommunications equipment installers and repairers	226	10.4	20.7	23	5
49-2021	Radio mechanics	7	10.4	20.7	1	(²)
49-2022	Telecommunications equipment installers and repairers, except line installers	219	10.4	20.7	23	5
49-2090	Miscellaneous electrical and electronic equipment mechanics, installers, and repairers	284	10.2	21.8	31	6
49-2091	Avionics technicians	23	11.3	24.2	3	1

See footnotes at end of table.

Table V–5. Total and net replacement rates and annual average replacement needs, 2002–12—Continued

(Numbers in thousands)

2002 national employment matrix occupation		Total employment, 2002	Replacement rate (Percent)		Annual average replacement needs, 2002–12	
			Total, 2001–02	Net, 2002–12	Total	Net
49-2092	Electric motor, power tool, and related repairers	31	10.7	24.0	3	1
49-2093	Electrical and electronics installers and repairers, transportation equipment	18	12.9	24.4	2	(²)
49-2094	Electrical and electronics repairers, commercial and industrial equipment	85	10.4	22.0	9	2
49-2095	Electrical and electronics repairers, powerhouse, substation, and relay	21	10.4	22.0	2	(²)
49-2096	Electronic equipment installers and repairers, motor vehicles	18	6.4	24.2	1	(²)
49-2097	Electronic home entertainment equipment installers and repairers	43	11.7	19.6	5	1
49-2098	Security and fire alarm systems installers	46	8.0	19.1	4	1
49-2099	All other electrical and electronic equipment mechanics, installers, and repairers	22	10.4	20.7	3	(²)
49-3000	Vehicle and mobile equipment mechanics, installers, and repairers	1,817	10.9	25.8	210	47
49-3011	Aircraft mechanics and service technicians ¹	131	7.7	23.6	11	3
49-3020	Automotive technicians and repairers	1,038	10.9	25.2	121	26
49-3021	Automotive body and related repairers	198	10.4	20.3	22	4
49-3022	Automotive glass installers and repairers	22	12.4	19.0	3	(²)
49-3023	Automotive service technicians and mechanics	818	11.0	26.6	96	22
49-3031	Bus and truck mechanics and diesel engine specialists	267	9.1	25.7	26	7
49-3040	Heavy vehicle and mobile equipment service technicians and mechanics	176	8.8	21.7	16	4
49-3041	Farm equipment mechanics	35	8.8	21.7	3	1
49-3042	Mobile heavy equipment mechanics, except engines	126	8.8	21.7	12	3
49-3043	Rail car repairers	15	8.8	21.7	1	(²)
49-3050	Small engine mechanics	67	6.6	24.8	5	2
49-3051	Motorboat mechanics ¹	22	6.6	24.8	2	1
49-3052	Motorcycle mechanics ¹	15	6.6	24.8	1	(²)
49-3053	Outdoor power equipment and other small engine mechanics ¹	30	6.6	24.8	2	1
49-3090	Miscellaneous vehicle and mobile equipment mechanics, installers, and repairers ¹	102	25.7	42.5	28	4
49-3091	Bicycle repairers	7	25.7	42.5	2	(²)
49-3092	Recreational vehicle service technicians	13	25.7	42.5	4	1
49-3093	Tire repairers and changers	83	25.7	42.5	22	4
49-3099	All other vehicle and mobile equipment mechanics, installers, and repairers	36	11.0	26.6	4	1
49-9000	Other installation, maintenance, and repair occupations	2,746	10.7	21.6	316	59
49-9010	Control and valve installers and repairers	49	11.4	25.0	6	1
49-9011	Mechanical door repairers	11	11.4	25.0	1	(²)
49-9012	Control and valve installers and repairers, except mechanical door	38	11.4	25.0	5	1
49-9021	Heating, air conditioning, and refrigeration mechanics and installers	249	10.9	13.3	31	3
49-9031	Home appliance repairers	42	11.8	23.8	5	1
49-9040	Industrial machinery installation, repair, and maintenance workers	1,628	10.1	19.7	176	32
49-9041	Industrial machinery mechanics	197	9.2	20.1	19	4
49-9042	Maintenance and repair workers, general	1,266	10.6	19.2	145	24
49-9043	Maintenance workers, machinery	92	4.7	22.6	4	2
49-9044	Millwrights	69	9.4	24.3	7	2
49-9045	Refractory materials repairers, except brickmasons	4	9.2	20.1	(²)	(²)
49-9050	Line installers and repairers	268	7.1	28.9	20	8
49-9051	Electrical power-line installers and repairers	101	8.9	31.7	9	3
49-9052	Telecommunications line installers and repairers	167	6.1	27.2	11	5
49-9060	Precision instrument and equipment repairers	64	11.1	28.0	7	2
49-9061	Camera and photographic equipment repairers	7	11.1	28.0	1	(²)
49-9062	Medical equipment repairers	29	11.1	28.0	3	1
49-9063	Musical instrument repairers and tuners	6	11.1	28.0	1	(²)
49-9064	Watch repairers	5	11.1	28.0	1	(²)
49-9069	All other precision instrument and equipment repairers	17	11.1	28.0	2	(²)
49-9090	Miscellaneous installation, maintenance, and repair workers	447	14.5	27.4	70	12
49-9091	Coin, vending, and amusement machine servicers and repairers	43	14.0	24.2	6	1
49-9092	Commercial divers ¹	4	14.8	15.1	1	(²)
49-9093	Fabric menders, except garment	2	10.6	22.7	(²)	(²)
49-9094	Locksmiths and safe repairers ¹	23	11.2	33.4	3	1
49-9095	Manufactured building and mobile home installers	18	9.5	24.3	2	(²)
49-9096	Riggers	14	19.2	22.8	3	(²)
49-9097	Signal and track switch repairers	8	11.7	35.0	1	(²)
49-9098	Helpers—installation, maintenance, and repair workers ¹	150	20.1	33.8	33	5
49-9099	Installation, maintenance, and repair workers, all other	185	10.6	22.7	21	4
51-0000	Production occupations	11,258	12.8	23.8	1,461	268

See footnotes at end of table.

Table V–5. Total and net replacement rates and annual average replacement needs, 2002–12—Continued

(Numbers in thousands)

2002 national employment matrix occupation		Total employment, 2002	Replacement rate (Percent)		Annual average replacement needs, 2002–12	
			Total, 2001–02	Net, 2002–12	Total	Net
51-1000	Supervisors, production workers	733	8.0	21.0	62	15
51-1011	First-line supervisors/managers of production and operating workers	733	8.0	21.0	62	15
51-2000	Assemblers and fabricators	2,122	11.2	25.4	233	54
51-2011	Aircraft structure, surfaces, rigging, and systems assemblers	27	6.5	27.4	2	1
51-2020	Electrical, electronics, and electromechanical assemblers	377	6.8	23.6	24	9
51-2021	Coil winders, tapers, and finishers	36	6.8	23.6	2	1
51-2022	Electrical and electronic equipment assemblers	281	6.8	23.6	17	7
51-2023	Electromechanical equipment assemblers	60	6.8	23.6	4	1
51-2031	Engine and other machine assemblers	50	6.3	28.0	3	1
51-2041	Structural metal fabricators and fitters	89	15.7	23.5	14	2
51-2090	Miscellaneous assemblers and fabricators	1,579	12.1	25.9	191	41
51-2091	Fiberglass laminators and fabricators	37	12.1	25.9	5	1
51-2092	Team assemblers	1,174	12.1	25.9	141	30
51-2093	Timing device assemblers, adjusters, and calibrators	7	12.1	25.9	1	(²)
51-2099	All other assemblers and fabricators	361	12.1	25.9	44	9
51-3000	Food processing occupations	757	15.5	22.7	123	17
51-3011	Bakers	173	15.5	23.2	28	4
51-3020	Butchers and other meat, poultry, and fish processing workers	414	15.9	21.9	69	9
51-3021	Butchers and meat cutters	132	15.9	21.9	21	3
51-3022	Meat, poultry, and fish cutters and trimmers	154	15.9	21.9	26	3
51-3023	Slaughterers and meat packers	128	15.9	21.9	22	3
51-3090	Miscellaneous food processing workers	127	14.1	24.8	19	3
51-3091	Food and tobacco roasting, baking, and drying machine operators and tenders	19	13.4	28.6	3	1
51-3092	Food batchmakers ¹	74	13.5	24.6	10	2
51-3093	Food cooking machine operators and tenders	34	16.0	22.9	6	1
51-3099	All other food processing workers	42	15.9	21.9	7	1
51-4000	Metal workers and plastic workers	2,367	10.4	24.2	254	57
51-4010	Computer control programmers and operators	151	7.2	16.5	11	2
51-4011	Computer-controlled machine tool operators, metal and plastic	132	7.2	16.5	10	2
51-4012	Numerical tool and process control programmers	19	7.2	16.5	1	(²)
51-4020	Forming machine setters, operators, and tenders, metal and plastic	188	10.2	26.3	20	5
51-4021	Extruding and drawing machine setters, operators, and tenders, metal and plastic ¹	98	13.3	33.3	13	3
51-4022	Forging machine setters, operators, and tenders, metal and plastic ¹	45	6.1	14.7	3	1
51-4023	Rolling machine setters, operators, and tenders, metal and plastic	44	7.3	22.6	3	1
51-4030	Machine tool cutting setters, operators, and tenders, metal and plastic	546	10.6	22.1	59	12
51-4031	Cutting, punching, and press machine setters, operators, and tenders, metal and plastic	283	12.5	23.2	37	7
51-4032	Drilling and boring machine tool setters, operators, and tenders, metal and plastic ¹	53	9.0	29.2	5	2
51-4033	Grinding, lapping, polishing, and buffing machine tool setters, operators, and tenders, metal and plastic	104	8.4	19.1	9	2
51-4034	Lathe and turning machine tool setters, operators, and tenders, metal and plastic	75	8.7	19.2	7	1
51-4035	Milling and planing machine setters, operators, and tenders, metal and plastic	31	7.1	17.2	2	1
51-4041	Machinists	387	6.9	23.3	28	9
51-4050	Metal furnace and kiln operators and tenders	31	13.3	22.4	4	1
51-4051	Metal-refining furnace operators and tenders ¹	18	13.3	22.4	2	(²)
51-4052	Pourers and casters, metal ¹	13	13.3	22.4	2	(²)
51-4060	Model makers and patternmakers, metal and plastic	15	6.3	31.9	1	(²)
51-4061	Model makers, metal and plastic	9	6.3	31.9	1	(²)
51-4062	Patternmakers, metal and plastic	6	6.3	31.9	(²)	(²)
51-4070	Molders and molding machine setters, operators, and tenders, metal and plastic	174	11.0	24.9	20	4
51-4071	Foundry mold and coremakers	23	11.0	24.9	3	1
51-4072	Molding, coremaking, and casting machine setters, operators, and tenders, metal and plastic	151	11.0	24.9	17	4
51-4081	Multiple machine tool setters, operators, and tenders, metal and plastic	99	7.1	27.6	7	3
51-4111	Tool and die makers	109	2.5	22.5	3	2
51-4120	Welding, soldering, and brazing workers	452	16.5	28.2	80	13
51-4121	Welders, cutters, solderers, and brazers	391	16.5	28.2	70	11
51-4122	Welding, soldering, and brazing machine setters, operators, and tenders	61	16.5	28.2	10	2
51-4190	Miscellaneous metalworkers and plastic workers	215	10.0	24.9	22	5
51-4191	Heat treating equipment setters, operators, and tenders, metal and plastic ¹	29	12.9	31.4	4	1

See footnotes at end of table.

Table V–5. Total and net replacement rates and annual average replacement needs, 2002–12—Continued

(Numbers in thousands)

2002 national employment matrix occupation		Total employment, 2002	Replacement rate (Percent)		Annual average replacement needs, 2002–12	
			Total, 2001–02	Net, 2002–12	Total	Net
51-4192	Lay-out workers, metal and plastic	13	6.4	15.2	1	(²)
51-4193	Plating and coating machine setters, operators, and tenders, metal and plastic ¹	44	13.0	21.8	6	1
51-4194	Tool grinders, filers, and sharpeners ¹	26	6.0	32.4	2	1
51-4199	All other metal workers and plastic workers	104	9.5	23.7	10	2
51-5000	Printing occupations	465	10.9	24.0	51	11
51-5010	Bookbinders and bindery workers	98	6.4	26.7	6	3
51-5011	Bindery workers ¹	91	6.4	26.7	6	2
51-5012	Bookbinders ¹	7	6.4	26.7	(²)	(²)
51-5020	Printers	346	12.0	23.3	42	8
51-5021	Job printers	56	10.8	23.5	6	1
51-5022	Prepress technicians and workers	91	6.2	23.4	5	2
51-5023	Printing machine operators	199	14.7	23.2	30	5
51-5099	All other printing workers	21	14.7	23.2	3	(²)
51-6000	Textile, apparel, and furnishings occupations	1,085	15.6	19.3	157	21
51-6011	Laundry and dry-cleaning workers	231	19.1	27.2	47	6
51-6021	Pressers, textile, garment, and related materials	91	21.1	15.7	19	1
51-6031	Sewing machine operators	315	12.5	12.4	33	4
51-6040	Shoe and leather workers	23	13.6	26.1	3	1
51-6041	Shoe and leather workers and repairers ¹	16	14.6	31.4	2	1
51-6042	Shoe machine operators and tenders ¹	7	11.0	13.0	1	(²)
51-6050	Tailors, dressmakers, and sewers	90	16.2	17.4	14	2
51-6051	Sewers, hand	36	16.2	17.4	5	1
51-6052	Tailors, dressmakers, and custom sewers	53	16.2	17.4	8	1
51-6060	Textile machine setters, operators, and tenders	179	12.7	18.1	19	3
51-6061	Textile bleaching and dyeing machine operators and tenders	27	13.2	25.6	3	1
51-6062	Textile cutting machine setters, operators, and tenders	34	11.0	22.1	3	1
51-6063	Textile knitting and weaving machine setters, operators, and tenders ¹	53	10.7	11.2	5	1
51-6064	Textile winding, twisting, and drawing out machine setters, operators, and tenders ¹	66	14.9	18.6	8	1
51-6090	Miscellaneous textile, apparel, and furnishings workers	156	14.7	25.2	22	4
51-6091	Extruding and forming machine setters, operators, and tenders, synthetic and glass fibers ¹	27	14.9	19.4	4	1
51-6092	Fabric and apparel patternmakers ¹	11	12.4	46.7	1	1
51-6093	Upholsterers ¹	56	15.5	25.4	8	1
51-6099	All other textile, apparel, and furnishings workers	61	14.3	23.6	9	1
51-7000	Woodworkers	374	11.8	25.7	45	10
51-7011	Cabinetmakers and bench carpenters	147	9.3	25.1	14	4
51-7021	Furniture finishers ¹	39	8.5	20.2	3	1
51-7030	Model makers and patternmakers, wood	9	7.3	29.0	1	(²)
51-7031	Model makers, wood ¹	4	7.3	29.0	(²)	(²)
51-7032	Patternmakers, wood ¹	4	7.3	29.0	(²)	(²)
51-7040	Woodworking machine setters, operators, and tenders	151	15.7	27.0	24	4
51-7041	Sawing machine setters, operators, and tenders, wood	56	18.0	28.3	10	2
51-7042	Woodworking machine setters, operators, and tenders, except sawing	95	14.4	26.3	14	2
51-7099	All other woodworkers ¹	29	10.5	28.9	3	1
51-8000	Plant and system operators	346	7.3	29.4	26	10
51-8010	Power plant operators, distributors, and dispatchers	51	7.1	26.9	4	1
51-8011	Nuclear power reactor operators ¹	3	7.1	26.9	(²)	(²)
51-8012	Power distributors and dispatchers ¹	12	7.1	26.9	1	(²)
51-8013	Power plant operators ¹	35	7.1	26.9	3	1
51-8021	Stationary engineers and boiler operators	55	7.8	18.5	4	1
51-8031	Water and liquid waste treatment plant and system operators ¹	99	7.0	34.4	8	3
51-8090	Miscellaneous plant and system operators	141	7.4	31.0	10	4
51-8091	Chemical plant and system operators ¹	58	7.4	31.0	4	2
51-8092	Gas plant operators ¹	12	7.4	31.0	1	(²)
51-8093	Petroleum pump system operators, refinery operators, and gaugers ¹	39	7.4	31.0	3	1
51-8099	All other plant and system operators ¹	32	7.4	31.0	2	1
51-9000	Other production occupations	3,010	16.3	24.2	510	73
51-9010	Chemical processing machine setters, operators, and tenders	94	13.4	32.0	12	3
51-9011	Chemical equipment operators and tenders ¹	58	13.4	32.0	8	2
51-9012	Separating, filtering, clarifying, precipitating, and still machine setters, operators, and tenders ¹	36	13.4	32.0	5	1

See footnotes at end of table.

Table V–5. Total and net replacement rates and annual average replacement needs, 2002–12—Continued

(Numbers in thousands)

2002 national employment matrix occupation		Total employment, 2002	Replacement rate (Percent)		Annual average replacement needs, 2002–12	
			Total, 2001–02	Net, 2002–12	Total	Net
51-9020	Crushing, grinding, polishing, mixing, and blending workers	196	13.2	26.1	26	5
51-9021	Crushing, grinding, and polishing machine setters, operators, and tenders	45	13.2	26.1	6	1
51-9022	Grinding and polishing workers, hand	45	13.2	26.1	6	1
51-9023	Mixing and blending machine setters, operators, and tenders	106	13.2	26.1	14	3
51-9030	Cutting workers	109	14.3	20.7	16	2
51-9031	Cutters and trimmers, hand	31	14.3	20.7	5	1
51-9032	Cutting and slicing machine setters, operators, and tenders	77	14.3	20.7	11	2
51-9041	Extruding, forming, pressing, and compacting machine setters, operators, and tenders	73	13.4	26.3	10	2
51-9051	Furnace, kiln, oven, drier, and kettle operators and tenders	31	13.3	23.9	4	1
51-9061	Inspectors, testers, sorters, samplers, and weighers	515	16.3	22.8	86	12
51-9071	Jewelers and precious stone and metal workers ¹	40	6.6	19.9	3	1
51-9080	Medical, dental, and ophthalmic laboratory technicians	94	5.5	21.9	5	2
51-9081	Dental laboratory technicians	47	5.5	21.9	3	1
51-9082	Medical appliance technicians	14	5.5	21.9	1	(²)
51-9083	Ophthalmic laboratory technicians	33	5.5	21.9	2	1
51-9111	Packaging and filling machine operators and tenders	387	15.8	19.9	68	8
51-9120	Painting workers	187	15.7	26.1	31	5
51-9121	Coating, painting, and spraying machine setters, operators, and tenders	103	15.7	26.1	17	3
51-9122	Painters, transportation equipment	50	15.7	26.1	9	1
51-9123	Painting, coating, and decorating workers	34	15.7	26.1	6	1
51-9130	Photographic process workers and processing machine operators	82	15.2	24.7	13	2
51-9131	Photographic process workers	28	15.2	24.7	4	1
51-9132	Photographic processing machine operators	54	15.2	24.7	9	1
51-9141	Semiconductor processors	46	8.1	22.1	4	1
51-9190	Miscellaneous production workers	1,155	19.3	25.5	232	29
51-9191	Cementing and gluing machine operators and tenders ¹	27	13.4	27.2	4	1
51-9192	Cleaning, washing, and metal pickling equipment operators and tenders	18	13.5	29.2	3	1
51-9193	Cooling and freezing equipment operators and tenders	7	14.6	28.0	1	(²)
51-9194	Etchers and engravers ¹	10	7.5	27.5	1	(²)
51-9195	Molders, shapers, and casters, except metal and plastic	46	12.6	23.8	6	1
51-9196	Paper goods machine setters, operators, and tenders	117	13.4	21.2	15	2
51-9197	Tire builders	14	13.4	23.6	2	(²)
51-9198	Helpers—production workers	467	27.9	28.0	135	13
51-9199	All other production workers	449	13.9	23.9	66	11
53-0000	Transportation and material moving occupations	9,828	17.9	22.4	1,870	220
53-1000	Supervisors, transportation and material moving workers	364	9.7	23.5	38	9
53-1011	Aircraft cargo handling supervisors	9	9.7	23.5	1	(²)
53-1021	First-line supervisors/managers of helpers, laborers, and material movers, hand	147	9.7	23.5	15	3
53-1031	First-line supervisors/managers of transportation and material-moving machine and vehicle operators	207	9.7	23.5	21	5
53-2000	Air transportation occupations	144	6.6	26.2	10	4
53-2010	Aircraft pilots and flight engineers	100	6.1	26.7	7	3
53-2011	Airline pilots, copilots, and flight engineers ¹	79	6.1	26.7	5	2
53-2012	Commercial pilots ¹	21	6.1	26.7	1	1
53-2020	Air traffic controllers and airfield operations specialists	32	6.9	25.7	2	1
53-2021	Air traffic controllers ¹	26	6.9	25.7	2	1
53-2022	Airfield operations specialists ¹	6	6.9	25.7	(²)	(²)
53-2099	All other air transportation workers	12	9.7	23.5	1	(²)
53-3000	Motor vehicle operators	4,136	16.2	15.1	732	62
53-3011	Ambulance drivers and attendants, except emergency medical technicians	17	20.7	10.2	4	(²)
53-3020	Bus drivers	654	15.0	21.8	106	14
53-3021	Bus drivers, transit and intercity	202	15.0	21.8	33	4
53-3022	Bus drivers, school	453	15.0	21.8	74	10
53-3030	Driver/sales workers and truck drivers	3,221	16.3	14.1	575	45
53-3031	Driver/sales workers	431	15.0	16.3	66	7
53-3032	Truck drivers, heavy and tractor-trailer	1,767	15.0	16.3	291	29
53-3033	Truck drivers, light or delivery services	1,022	19.1	9.2	218	9
53-3041	Taxi drivers and chauffeurs	132	19.1	9.2	28	1
53-3099	All other motor vehicle operators	111	15.5	14.1	19	2

See footnotes at end of table.

Table V–5. Total and net replacement rates and annual average replacement needs, 2002–12—Continued

(Numbers in thousands)

2002 national employment matrix occupation		Total employment, 2002	Replacement rate (Percent)		Annual average replacement needs, 2002–12	
			Total, 2001–02	Net, 2002–12	Total	Net
53-4000	Rail transportation occupations	101	12.6	25.9	12	3
53-4010	Locomotive engineers and operators ¹	33	12.8	29.3	4	1
53-4021	Railroad brake, signal, and switch operators ¹	15	11.9	10.7	2	(²)
53-4031	Railroad conductors and yardmasters ¹	38	13.0	27.1	5	1
53-4039	Subway, streetcar operators and all other rail transportation workers	15	12.0	30.7	2	(²)
53-5000	Water transportation occupations	68	10.9	32.8	8	2
53-5011	Sailors and marine oilers ¹	27	10.7	35.3	3	1
53-5020	Ship and boat captains and operators	29	12.4	28.5	4	1
53-5021	Captains, mates, and pilots of water vessels ¹	25	12.4	28.5	3	1
53-5022	Motorboat operators ¹	4	12.4	28.5	1	(²)
53-5031	Ship engineers	8	7.1	44.0	1	(²)
53-5099	All other water transportation workers	4	9.7	23.5	(²)	(²)
53-6000	Other transportation workers	294	17.2	34.7	53	10
53-6011	Bridge and lock tenders	4	11.8	31.4	(²)	(²)
53-6021	Parking lot attendants ¹	107	15.5	29.7	18	3
53-6031	Service station attendants	107	21.4	44.9	23	5
53-6041	Traffic technicians	6	14.1	30.1	1	(²)
53-6051	Transportation inspectors	29	14.5	23.8	4	1
53-6099	All other related transportation workers	40	14.1	30.1	6	1
53-7000	Material moving occupations	4,722	20.6	27.6	1,017	130
53-7011	Conveyor operators and tenders	58	13.9	28.7	9	2
53-7021	Crane and tower operators	50	8.9	21.8	5	1
53-7030	Dredge, excavating, and loading machine operators	87	17.2	27.5	16	2
53-7031	Dredge operators ¹	3	17.2	27.5	1	(²)
53-7032	Excavating and loading machine and dragline operators ¹	80	17.2	27.5	14	2
53-7033	Loading machine operators, underground mining ¹	4	17.2	27.5	1	(²)
53-7041	Hoist and winch operators ¹	9	9.9	31.7	1	(²)
53-7051	Industrial truck and tractor operators	594	14.6	18.9	92	11
53-7060	Laborers and material movers, hand	3,659	21.8	29.1	830	107
53-7061	Cleaners of vehicles and equipment	344	20.7	34.8	74	12
53-7062	Laborers and freight, stock, and material movers, hand	2,231	22.9	32.7	527	73
53-7063	Machine feeders and offbearers	164	18.8	27.3	31	4
53-7064	Packers and packagers, hand	920	20.1	18.7	198	17
53-7070	Pumping station operators	32	12.6	23.3	4	1
53-7071	Gas compressor and gas pumping station operators	7	12.6	23.3	1	(²)
53-7072	Pump operators, except wellhead pumpers	13	12.6	23.3	2	(²)
53-7073	Wellhead pumpers	11	12.6	23.3	1	(²)
53-7081	Refuse and recyclable material collectors ¹	134	29.3	25.6	43	3
53-7111	Shuttle car operators	3	19.3	24.9	1	(²)
53-7121	Tank car, truck, and ship loaders	17	19.6	27.8	3	(²)
53-7199	Material moving workers, all other	78	18.0	26.8	15	2

¹ One or more Current Population Survey (CPS) proxy occupations may be used to estimate CPS-based data. See Chapter III.

² Less than 500.